United States Department of Agriculture

Natural Resources Conservation Service

Iowa Department of Agriculture and Land Stewardship

Iowa State University
Iowa Agriculture and Home Economics Experiment Station

Iowa State University
University Extension

In cooperation with Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; and Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship

Soil Survey of Crawford County, Iowa

Part I

How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of soils called associations. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the soil associations on the color-coded map legend, and then refer to the section **General Soil Map Units** in Part I for a general description of the soils in your area.

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets** in Part III. Note the number of the map sheet, and turn to that sheet. Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. The **Contents** in Part I lists the map units and shows the page where each map unit is described.

The **Contents** in Part II shows which table has information on a specific land use or soil property for each detailed soil map unit. Also, see the **Contents** in Part I and Part II for other sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2002. Soil names and descriptions were approved in 2004. This survey was made cooperatively by the Natural Resources Conservation Service; the Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship. The survey is part of the technical assistance furnished to the Crawford County Soil and Water Conservation District.

Cover: Contour farming and terraces in an area of Marshall soils. Corn and soybeans are planted in this area in alternate seasons.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

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Foreword

Soil surveys contain information that affects land use planning in survey areas. They include predictions of soil behavior for selected land uses. The surveys highlight soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

Soil surveys are designed for many different users. Farmers, foresters, and agronomists can use the surveys to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the surveys to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the surveys to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of
Crawford County, Iowa

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United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with the Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship

CRAWFORD COUNTY is in west-central Iowa (fig. 1). It has an area of 457,200 acres, or about 713 square miles. It is bounded on the west by Monona County, on the east by Carroll County, on the north by Ida and Sac Counties, and on the south by Shelby County. Denison is the county seat.

This survey updates a previous survey of Crawford County published in 1973 (Kovar and others, 1973).

General Nature of the Survey Area

This section provides some general information about the survey area. It describes history; resources, transportation facilities, and recreation; cropland; physiography, relief, and drainage; and climate.

History

The survey area was at various times a part of the empires of three European powers: Spain, England, and France. These countries did little to govern this territory, which had been the tribal hunting grounds of several indigenous peoples, including the Sioux, Omaha, and Otoe tribes and occasionally the Potawatomi. Game was plentiful.

As a result of the Louisiana Purchase in 1803, the survey area became part of the United States.

Crawford County was established in 1851. It was named in honor of William Harris Crawford, a statesman from Georgia, who served as U.S. Senator, Secretary of War, Secretary of the Treasury, and Minister to France and was a presidential candidate in 1824.

The early settlers of Crawford County came from three sources: the natural migration from the east starting in 1849, the Mormon migration from the west in 1846, and the promotion of land on the frontier by the Providence Western Land Company of

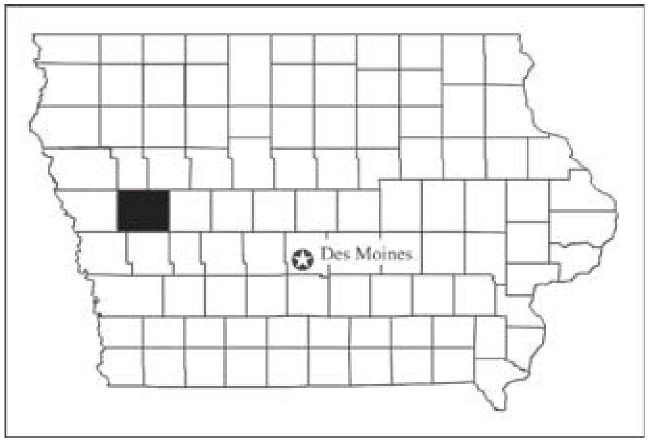

Figure 1.—Location of Crawford County in Iowa.

Providence, Rhode Island. The company had purchased 20,000 acres in the center of Crawford County. Jesse W. Denison was chosen by this company to carry on the work of beginning a settlement and encouraging settlers to buy the company's land. He arrived in Crawford County in 1856 to find about 235 settlers scattered throughout the county. Within 15 years the population of Denison was 800 and growing fast.

The first railway arrived in Crawford County in 1867. The railroad greatly improved transportation and access to markets and thus affected the settlement and development of the entire county.

Resources, Transportation Facilities, and Recreation

The most valuable natural resources in Crawford County are the soils on agricultural lands. Most of the acreage in the county is devoted to farmland. Farming is diversified and includes crop production and livestock. Areas in the uplands that are less sloping are well suited to row crops, forage, and pasture.

Sand and gravel are in many parts of the county. These resources typically occur in association with major streams and rivers.

Wildlife is plentiful in Crawford County. Deer, pheasant, turkey, quail, and small furbearers are common because of good habitat and an adequate food supply. Fish are common in the rivers, ditches, and impoundments in the county.

The county has a good farm-to-market road system. Federal, State, and county highways provide good access to all parts of the county. State Highway 30 runs east and west through Westside, Vail, Denison, Arion, and Dow City. State Highway 59 runs north and south through Schleswig and Denison. State Highway 39 runs north and south through Kiron, Deloit, and Denison. State Highway 141 runs east and west through Charter Oak, Denison, and Aspinwall. Paved county roads and gravel roads provide additional transportation routes.

Railroad freight service is available in Dow City, Arion, Denison, Deloit, Vail, Westside, Manilla, and Aspinwall. Truck service is available to all communities. Bus service is available in many parts of the county. Small aircraft are served at Denison. The closest commercial flights are in Sioux City and Omaha.

State and county parks provide facilities for camping, fishing, hunting, picnicking, hiking, and sightseeing (fig. 2). Many of the towns in the county have well furnished city parks.

Cropland

In 2002, according to the Iowa Agricultural Statistics Service, about 445,913 acres in Crawford County was used as farmland and the average farm size was 481 acres. About 394,932 acres was used for crops, and about 50,982 acres was used as pasture, was enrolled in a government set-aside program, or was used for other purposes. About 177,115 acres was used for corn for grain; 2,677 acres for corn for silage; 163,877 acres for soybeans; 1,105 acres for oats; and 17,036 acres for forage, grass silage, green chop, and other hay.

The soils in Crawford County have good potential for sustained, efficient crop production provided they are managed according to their properties and capabilities. The information in this soil survey can be used to apply the crop production technology necessary for sustained, efficient crop production.

Water erosion is the major management concern in areas used as cropland. It is a hazard where the slope is more than about 2 percent. It becomes progressively more severe with increasing slope. Sheet and rill erosion is the most common type of water erosion in the county, but gully erosion also occurs in some areas. Most gully erosion occurs in the more sloping areas of Monona, Ida, Marshall, and Exira soils. Accelerated runoff from the adjacent, less sloping cultivated soils on ridgetops increases the rate of gully erosion on the more sloping soils on side slopes in these areas.

Water erosion reduces the efficiency of crop production. Research indicates that yields are reduced by topsoil losses and that additional fertilizers can only partially compensate for lost topsoil. Fertilizers and other soil-applied chemicals are lost along with topsoil when soils erode.

The amount of soil loss is sometimes underestimated because tillage typically maintains the thickness of the surface layer by incorporating material from the

Figure 2.—Nelson Park Pond provides water for recreational activities and helps to control erosion in waterways downstream. The pond is in an area of Knox silt loam, 20 to 30 percent slopes.

subsurface layer or subsoil. When this material is incorporated into the surface layer, the content of organic matter and the level of fertility are reduced. The reduced content of organic matter in the surface layer increases the hazard of erosion. Research has shown that uneroded areas of Monona soils are much less erodible than soils that have similar textures but contain less organic matter (Meyer and Harmon, 1984).

Landscape position can also affect the erodibility of the soils (Johnson, 1988). For example, Monona soils on the upper side slopes and on some convex ridgetops are more susceptible to erosion than Monona soils that are on the lower side slopes.

Erosion can be controlled by cultural practices, erosion-control structures, or both. Cultural practices include farming on the contour and applying a system of conservation tillage that maintains a protective cover of residue on at least 30 percent of the surface. Erosion-control structures, such as terraces and sediment-control basins, can reduce the effective slope length.

Conservation tillage systems have both short-term and long-term benefits. Increasing the amount of crop residue on the soil surface reduces the runoff rate and the hazard of erosion in sloping areas. Most conservation tillage systems also require less total tillage than other systems. Over a long period, soils that have received less tillage have a higher content of organic matter and a higher level of nitrogen than other soils, even where there is no difference in degree of erosion (Lamb and others, 1985). Other changes in the physical and chemical properties of the soils are associated with conservation tillage. Most of these changes improve soil productivity or reduce production costs. In some soils under certain conditions, more soil nitrogen is lost through leaching and as gaseous nitrous oxide under a no-till system than under a conventional tillage system. In general, the most effective conservation tillage systems are those that leave the largest amount of crop residue on the soil surface.

Information about drainage and assistance in designing artificial drainage systems are available at the local office of the Natural Resources Conservation Service.

Physiography, Relief, and Drainage

The highest elevation in Crawford County is 1,560 feet. It is in the northeastern part of the county. The elevation changes in the county are relatively small.

Crawford County is part of a large upland plain that slopes generally to the southwest and drains into the Missouri River. The once relatively smooth plain has been incised by streams, and the topography ranges from nearly level to steep. Generally, the surface of the upland is characterized by rounded ridges and smooth slopes to the stream channels. Some areas are quite hilly and have steep slopes to the streams. The most hilly and sharply dissected areas are in the southwestern part of the county. The eastern part of the county has more uniform topography and is generally gently rolling. Stream channels are not so deeply incised, and erosion has not been as severe as in the rougher areas of the county.

In this region of western Iowa, the flat upland summits disappear almost entirely. The hills here appear as long, parallel crests of steep waves with broad troughs between them. The most extensive areas of level terrain occur along valley floors. The flood plains here and elsewhere across the state thus mark the lowest and youngest (Holocene) erosion surface cut into the landscape (Prior, 1991).

The county has a well developed natural drainage system, and streams and intermittent drainageways extend into all parts. Eventually, all of the drainage goes into the Missouri River. The Boyer River and its tributaries make up the primary drainage system that extends from the northeastern to the southwestern part of the county. Some of the larger tributaries of the Boyer River are Buffalo, Otter, Tucker, Trinkle, and Beaman Creeks. The Soldier, Middle Soldier, and East Soldier Rivers and Beaver Creek are the principal streams in the northwestern part of the county. Willow, Middle Willow, and South Willow Creek drain the southwestern part of the county and flow

generally parallel to the Boyer River. The Nishnabotna River and its tributaries drain the southeastern part of the county. Straightening and enlarging of the channels of the Boyer, Soldier, and Nishnabotna Rivers have largely eliminated damage from floods. In some places artificial drainage channels have been constructed at the junction of the creeks with the major streams.

The soils on the uplands in the county are mainly well drained. Colo and Zook soils on bottom land are poorly drained. In places artificial drainage is needed to achieve the most intensive use of these soils.

Climate

Tables providing information on the climate of the survey area are at the end of this section. Table 1 gives data on temperature and precipitation for the survey area as recorded in the period 1971-2000 at Denison, Iowa. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 22.3 degrees F and the average daily minimum temperature is 13.6 degrees. The lowest temperature on record is -39 degrees. In summer, the average temperature is 72 degrees and the average daily maximum temperature is 82.3 degrees. The highest temperature on record is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation is 30.42 inches. Of this total, 18.8 inches, or about 62 percent, usually falls in May through September. The growing season for most crops falls within this period.

The average seasonal snowfall is 35.9 inches. On an average, 66 days per year have at least 1 inch of snow on the ground.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 81 percent. The sun shines 70 percent of the time possible in summer and around 55 percent in winter. The prevailing wind is from the northwest from November to April and from the south during the rest of the year. Average windspeed is highest, around 13 miles per hour, in April.

How This Survey Was Made

This survey was made to provide updated information about the soils and miscellaneous areas in the survey area, which is in Major Land Resource Area 107. Major land resource areas (MLRAs) are geographically associated land resource units that share a common land use, elevation, topography, climate, water, soils, and vegetation (USDA/NRCS, 2006). Crawford County is a subset of MLRA 107. Map unit design is based on documentation of the occurrence of soil components throughout the MLRA.

The information in Part I of this survey includes brief descriptions of the soils and miscellaneous areas and descriptions of taxonomic units. Part II provides information on soil properties and their subsequent effects on suitability, limitations, and management of the soils for specified uses. Part III includes the detailed soil maps for the survey area.

During the fieldwork for this survey, soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which

is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landscape or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they observed. The maximum depth of observation was about 80 inches (6.7 feet). The soil scientists noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, soil reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Interpretations are modified as necessary to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a seasonal high water table within certain depths in most years, but they cannot predict that the water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area may not fully agree with those of the soils in adjacent survey areas. Differences are the result of an improved understanding of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Denison, Iowa)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	27.8	9.8	18.8	56	-19	0	0.80	0.23	1.41	2	7.8
February---	33.9	16.1	25.0	65	-17	0	.75	.31	1.07	2	6.6
March------	46.1	26.4	36.3	78	-3	21	2.16	.77	3.54	4	6.3
April------	59.9	37.9	48.9	88	16	111	3.03	1.51	4.26	6	2.3
May--------	71.3	49.8	60.6	89	31	338	4.14	2.54	5.50	7	.0
June-------	80.8	59.5	70.2	97	42	603	4.26	2.34	6.06	6	.0
July-------	84.2	64.0	74.1	98	50	748	3.87	1.51	6.02	6	.0
August-----	81.9	61.8	71.8	96	47	676	3.23	1.44	5.00	5	.0
September--	74.9	52.7	63.8	93	32	420	3.30	1.37	4.82	5	.0
October----	62.5	41.1	51.8	85	20	148	2.30	1.04	3.58	4	.7
November---	44.3	27.0	35.7	71	1	13	1.58	.60	2.48	3	4.1
December---	31.2	14.8	23.0	59	-15	0	1.00	.45	1.49	2	8.1
Yearly:											
Average---	58.2	38.4	48.3	---	---	---	---	---	---	---	---
Extreme---	105	-27	---	100	-22	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,079	30.42	23.96	36.71	52	35.9

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Denison, Iowa)

Probability	Temperature: 24 °F or lower	Temperature: 28 °F or lower	Temperature: 32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 16	Apr. 28	May 9
2 years in 10 later than--	Apr. 12	Apr. 23	May 4
5 years in 10 later than--	Apr. 5	Apr. 14	Apr. 25
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 15	Oct. 2	Sept. 21
2 years in 10 earlier than--	Oct. 20	Oct. 8	Sept. 26
5 years in 10 earlier than--	Oct. 30	Oct. 19	Oct. 6

Table 3.--Growing Season

(Recorded in the period 1971-2000 at Denison, Iowa)

Probability	Daily minimum temperature during growing season: Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	191	168	142
8 years in 10	196	174	149
5 years in 10	207	186	162
2 years in 10	217	198	175
1 year in 10	222	205	182

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These broad areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1—Monona-Napier-Ida Association (fig. 3)

Extent of the association in the survey area: 19 percent

Component Description

Monona, moderately eroded, and similar soils
Extent: 40 to 70 percent of the association
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 2 to 30 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Napier and similar soils
Extent: 15 to 35 percent of the association
Geomorphic setting: Drainageways
Position on the landform: Footslopes, toeslopes
Slope range: 2 to 9 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained

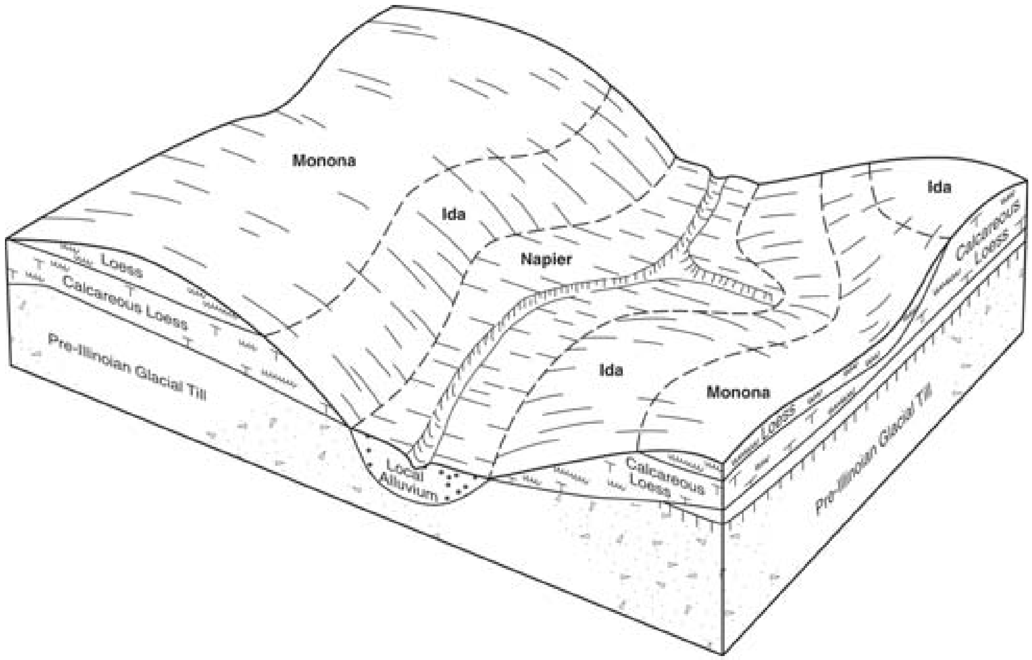

Figure 3.—Typical pattern of soils and parent material in the Monona-Napier-Ida association.

Parent material: Local alluvium
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.1 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Ida, severely eroded, and similar soils
Extent: 10 to 25 percent of the association
Geomorphic setting: Loess hills
Position on the landform: Summits, shoulders
Slope range: 5 to 30 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Kennebec
Extent: 0 to 10 percent of the association

Nodaway
Extent: 0 to 5 percent of the association

2—Monona Association (fig. 4)

Extent of the association in the survey area: 35 percent

Component Description

Monona, moderately eroded, and similar soils
Extent: 50 to 75 percent of the association
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 2 to 30 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Ida, severely eroded, and similar soils
Extent: 5 to 15 percent of the association

Judson and similar soils
Extent: 5 to 20 percent of the association

Ackmore and similar soils
Extent: 0 to 10 percent of the association

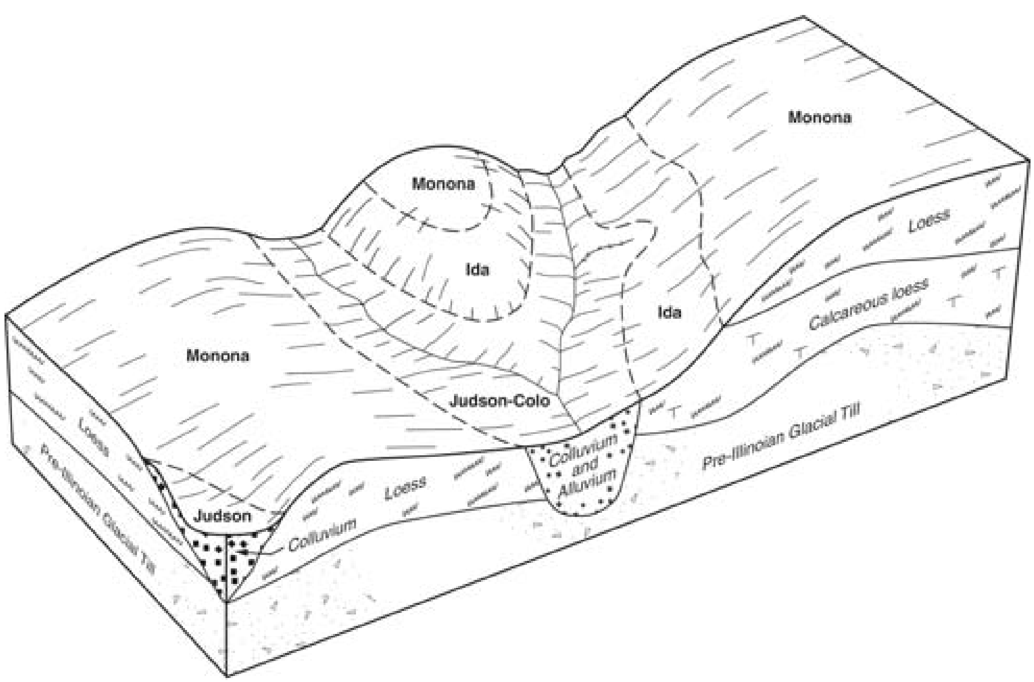

Figure 4.—Typical pattern of soils and parent material in the Monona association.

Colo, overwash, and similar soils
Extent: 0 to 10 percent of the association

3—Marshall-Judson Association (fig. 5)

Extent of the association in the survey area: 38 percent

Component Description

Marshall, moderately eroded, and similar soils
Extent: 60 to 80 percent of the association
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 0 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Judson and similar soils
Extent: 5 to 25 percent of the association
Geomorphic setting: Alluvial fans; drainageways
Position on the landform: Footslopes
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Colluvium

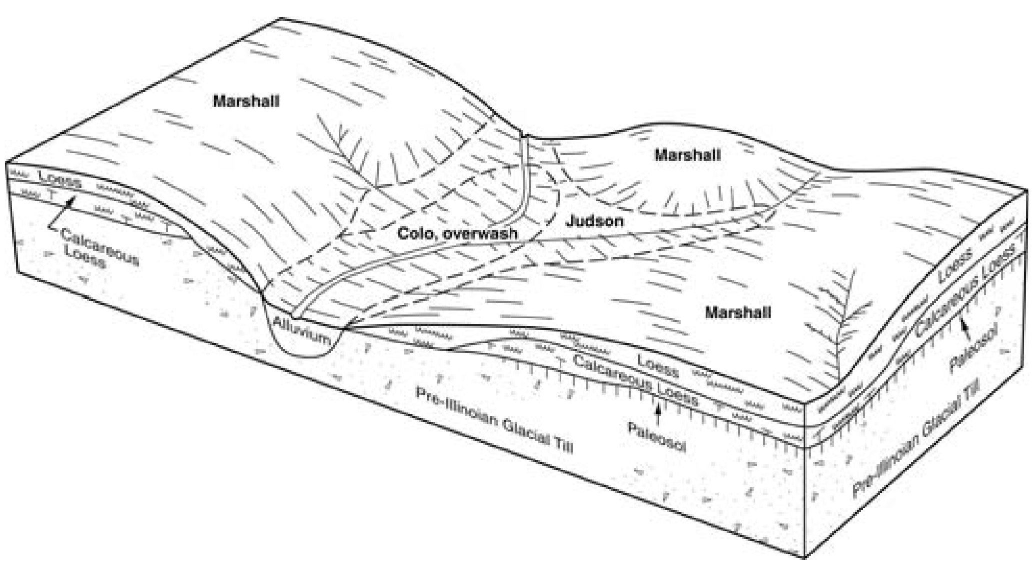

Figure 5.—Typical pattern of soils and parent material in the Marshall-Judson association.

Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Minor Dissimilar Components

Ackmore and similar soils
Extent: 0 to 15 percent of the association

Colo, overwash, and similar soils
Extent: 0 to 10 percent of the association

4—Nodaway Association (fig. 6)

Extent of the association in the survey area: 8 percent

Component Description

Nodaway and similar soils
Extent: 60 to 75 percent of the association
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)

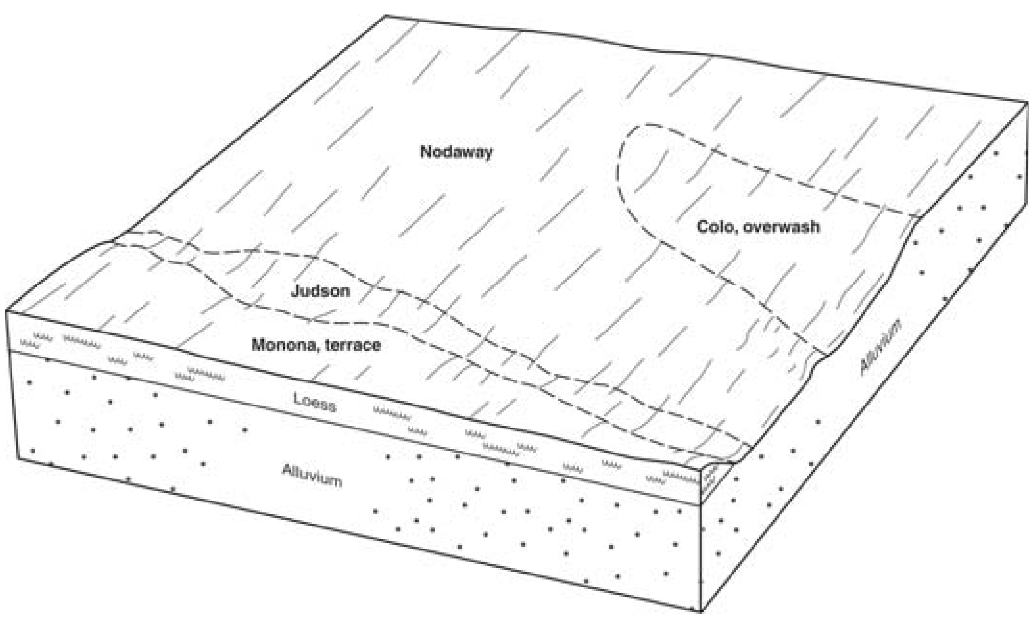

Figure 6.—Typical pattern of soils and parent material in the Nodaway association.

Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 5 to 20 percent of the association

Judson and similar soils
Extent: 5 to 15 percent of the association

Colo, overwash, and similar soils
Extent: 0 to 10 percent of the association

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and lists some of the principal soil properties that should be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown

on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Exira silty clay loam, 5 to 9 percent slopes, moderately eroded, is a phase of the Exira series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Ida-Chute complex, 9 to 14 percent slopes, severely eroded, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Pits, sand and gravel, is an example.

The table “Acreage and Proportionate Extent of the Soils” in Part II lists the map units in this survey area. Other tables provided in Part II give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

1C—Ida silt loam, 5 to 9 percent slopes

Component Description

Ida and similar soils
Extent: 90 to 100 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, summits
Slope range: 5 to 9 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

1C3—Ida silt loam, 5 to 9 percent slopes, severely eroded

Component Description

Ida, severely eroded, and similar soils
Extent: 70 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Summits, shoulders
Slope range: 5 to 9 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None

Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 0 to 20 percent of the unit

Monona, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

1D3—Ida silt loam, 9 to 14 percent slopes, severely eroded

Component Description

Ida, severely eroded, and similar soils
Extent: 60 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 5 to 20 percent of the unit

Monona, severely eroded, and similar soils
Extent: 5 to 20 percent of the unit

1E3—Ida silt loam, 14 to 20 percent slopes, severely eroded

Component Description

Ida, severely eroded, and similar soils
Extent: 55 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Monona and similar soils
Extent: 5 to 15 percent of the unit

Monona, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

Monona, moderately eroded, and similar soils
Extent: 0 to 15 percent of the unit

1F3—Ida silt loam, 20 to 30 percent slopes, severely eroded

Component Description

Ida, severely eroded, and similar soils
Extent: 55 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 20 to 30 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

Burchard, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

Monona and similar soils
Extent: 0 to 10 percent of the unit

Monona, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

8B—Judson silty clay loam, 2 to 5 percent slopes

Component Description

Judson and similar soils
Extent: 70 to 90 percent of the unit
Geomorphic setting: Alluvial fans; drainageways
Position on the landform: Footslopes
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Colluvium
Flooding: None

Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Minor Dissimilar Components

Ackmore and similar soils
Extent: 0 to 20 percent of the unit

Colo, overwash, and similar soils
Extent: 0 to 15 percent of the unit

8C—Judson silty clay loam, 5 to 9 percent slopes

Component Description

Judson and similar soils
Extent: 90 to 100 percent of the unit
Geomorphic setting: Alluvial fans; drainageways
Position on the landform: Footslopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Colluvium
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Minor Dissimilar Components

Colo, overwash, and similar soils
Extent: 0 to 10 percent of the unit

9—Marshall silty clay loam, 0 to 2 percent slopes

Component Description

Marshall and similar soils
Extent: 90 to 100 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Summits
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Minor Dissimilar Components

Minden and similar soils
Extent: 0 to 10 percent of the unit

9B—Marshall silty clay loam, 2 to 5 percent slopes

Component Description

Marshall and similar soils
Extent: 100 percent of the unit
Geomorphic setting: Loess hills (fig. 7)
Position on the landform: Summits
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 3.5 percent

9B2—Marshall silty clay loam, 2 to 5 percent slopes, moderately eroded

Component Description

Marshall, moderately eroded, and similar soils
Extent: 60 to 95 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Summits
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Marshall soils that are only slightly eroded
Extent: 5 to 20 percent of the unit

Exira, moderately eroded, and similar soils
Extent: 0 to 40 percent of the unit

9C—Marshall silty clay loam, 5 to 9 percent slopes

Component Description

Marshall and similar soils
Extent: 85 to 95 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, summits
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)

Figure 7.—A combination of terraces and contour farming helps to control erosion in an area of Marshall silty clay loam, 2 to 5 percent slopes. These practices also help to prevent siltation in the adjacent drainageways.

Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Minor Dissimilar Components

Marshall, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

9C2—Marshall silty clay loam, 5 to 9 percent slopes, moderately eroded

Component Description

Marshall, moderately eroded, and similar soils
Extent: 70 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Summits, shoulders
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None

Ponding: None
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Exira, moderately eroded, and similar soils
Extent: 0 to 20 percent of the unit

Marshall soils that are only slightly eroded
Extent: 5 to 20 percent of the unit

9D—Marshall silty clay loam, 9 to 14 percent slopes

Component Description

Marshall and similar soils
Extent: 80 to 95 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, backslopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Minor Dissimilar Components

Marshall, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

Exira, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

9D2—Marshall silty clay loam, 9 to 14 percent slopes, moderately eroded

Component Description

Marshall, moderately eroded, and similar soils
Extent: 60 to 80 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Exira, moderately eroded, and similar soils
Extent: 0 to 30 percent of the unit

Marshall soils that are only slightly eroded
Extent: 5 to 15 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

9E2—Marshall silty clay loam, 14 to 18 percent slopes, moderately eroded

Component Description

Marshall, moderately eroded, and similar soils
Extent: 60 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, backslopes
Slope range: 14 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Exira, moderately eroded, and similar soils
Extent: 0 to 20 percent of the unit

Marshall, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

Marshall soils that are only slightly eroded
Extent: 0 to 10 percent of the unit

9E3—Marshall silty clay loam, 14 to 18 percent slopes, severely eroded

Component Description

Marshall, severely eroded, and similar soils
Extent: 60 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, backslopes
Slope range: 14 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained

Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.5 inches
Content of organic matter in the upper 10 inches: 1.3 percent

Minor Dissimilar Components

Exira, moderately eroded, and similar soils
Extent: 0 to 20 percent of the unit

Marshall, moderately eroded, and similar soils
Extent: 5 to 20 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

10B—Monona silt loam, 2 to 5 percent slopes

Component Description

Monona and similar soils
Extent: 100 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, summits
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.9 inches
Content of organic matter in the upper 10 inches: 3.4 percent

10B2—Monona silt loam, 2 to 5 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 70 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Summits, shoulders
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Monona soils that are only slightly eroded
Extent: 10 to 20 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

10C2—Monona silt loam, 5 to 9 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 65 to 85 percent of the unit
Geomorphic setting: Loess hills (fig. 8)
Position on the landform: Backslopes, shoulders, summits
Slope range: 5 to 9 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Monona soils that are only slightly eroded
Extent: 5 to 25 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

10D2—Monona silt loam, 9 to 14 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 40 to 80 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Figure 8.—An area of Monona silt loam, 5 to 9 percent slopes, moderately eroded, that has been planted to native grasses for wildlife habitat.

Minor Dissimilar Components

Ida, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

Monona, severely eroded, and similar soils
Extent: 15 to 25 percent of the unit

Monona soils that are only slightly eroded
Extent: 0 to 10 percent of the unit

Napier and similar soils
Extent: 0 to 10 percent of the unit

10D3—Monona silt loam, 9 to 14 percent slopes, severely eroded

Component Description

Monona, severely eroded, and similar soils
Extent: 90 to 100 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None

Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Minor Dissimilar Components

Ida, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

10E2—Monona silt loam, 14 to 20 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 30 to 70 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Ida, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Monona, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

Monona soils that are only slightly eroded
Extent: 5 to 15 percent of the unit

Burchard, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

Napier and similar soils
Extent: 0 to 10 percent of the unit

10E3—Monona silt loam, 14 to 20 percent slopes, severely eroded

Component Description

Monona, severely eroded, and similar soils
Extent: 50 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)

Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 10 to 30 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 15 percent of the unit

Burchard, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

Napier and similar soils
Extent: 0 to 10 percent of the unit

10F2—Monona silt loam, 20 to 30 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 35 to 55 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 20 to 30 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Monona, slightly eroded, and similar soils
Extent: 10 to 30 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Monona, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

Burchard, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

Napier and similar soils
Extent: 0 to 10 percent of the unit

10F3—Monona silt loam, 20 to 30 percent slopes, severely eroded

Component Description

Monona, severely eroded, and similar soils
Extent: 50 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 20 to 30 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Minor Dissimilar Components

Ida, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Monona, moderately eroded, and similar soils
Extent: 0 to 30 percent of the unit

Burchard, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

12B—Napier silt loam, 2 to 5 percent slopes

Component Description

Napier and similar soils
Extent: 70 to 95 percent of the unit
Geomorphic setting: Drainageways
Position on the landform: Footslopes, toeslopes
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Local alluvium
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.1 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Monona and similar soils
Extent: 0 to 10 percent of the unit

Rawles and similar soils
Extent: 0 to 10 percent of the unit

Smithland and similar soils
Extent: 0 to 10 percent of the unit

12C—Napier silt loam, 5 to 9 percent slopes

Component Description

Napier and similar soils
Extent: 85 to 100 percent of the unit
Geomorphic setting: Drainageways
Position on the landform: Footslopes, toeslopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Local alluvium
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.1 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Monona and similar soils
Extent: 0 to 5 percent of the unit

Rawles and similar soils
Extent: 0 to 5 percent of the unit

Monona, moderately eroded, and similar soils
Extent: 0 to 5 percent of the unit

17B—Napier-Kennebec-Nodaway complex, 2 to 5 percent slopes

Component Description

Napier and similar soils
Extent: 25 to 60 percent of the unit
Geomorphic setting: Drainageways
Position on the landform: Footslopes, toeslopes
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Local alluvium
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.1 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Kennebec and similar soils
Extent: 20 to 40 percent of the unit
Geomorphic setting: Drainageways
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam

Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Frequent (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 13.4 inches
Content of organic matter in the upper 10 inches: 5.5 percent

Nodaway and similar soils
Extent: 10 to 20 percent of the unit
Geomorphic setting: Drainageways
Position on the landform: Footslopes, toeslopes
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Frequent (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Rawles and similar soils
Extent: 0 to 20 percent of the unit

Colo, overwash, and similar soils
Extent: 0 to 10 percent of the unit

22D2—Dow silt loam, 9 to 14 percent slopes, moderately eroded

Component Description

Dow, moderately eroded, and similar soils
Extent: 85 to 95 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 0.9 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

22D3—Dow silt loam, 9 to 14 percent slopes, severely eroded

Component Description

Dow, severely eroded, and similar soils
Extent: 85 to 95 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 0.9 percent

Minor Dissimilar Components

Monona, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

22E3—Dow silt loam, 14 to 20 percent slopes, severely eroded

Component Description

Dow, severely eroded, and similar soils
Extent: 70 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 0.9 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

Monona, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

26—Kennebec silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Kennebec and similar soils
Extent: 90 to 100 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 9.1 inches
Content of organic matter in the upper 10 inches: 5.5 percent

Minor Dissimilar Components

Kennebec, overwash, occasionally flooded, and similar soils
Extent: 0 to 10 percent of the unit

35D2—Liston-Burchard complex, 9 to 14 percent slopes, moderately eroded

Component Description

Liston, moderately eroded, and similar soils
Extent: 40 to 80 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.9 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Burchard, moderately eroded, and similar soils
Extent: 20 to 60 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till

Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.4 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Burchard, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Adair, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

35E2—Liston-Burchard complex, 14 to 18 percent slopes, moderately eroded

Component Description

Liston, moderately eroded, and similar soils
Extent: 40 to 80 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes, shoulders (fig. 9)
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.9 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Burchard, moderately eroded, and similar soils
Extent: 20 to 40 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes, shoulders (fig. 9)
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.4 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Burchard, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Adair, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

Figure 9.—The strongly sloping and moderately steep Liston and Burchard soils are in the foreground and in the distance. Nodaway soils are along the Boyer River in the middle distance.

35F2—Liston-Burchard complex, 18 to 25 percent slopes, moderately eroded

Component Description

Liston, moderately eroded, and similar soils
Extent: 30 to 40 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes
Slope range: 18 to 25 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.9 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Burchard, moderately eroded, and similar soils
Extent: 20 to 40 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes
Slope range: 18 to 25 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained

Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.4 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Minor Dissimilar Components

Burchard, severely eroded, and similar soils
Extent: 15 to 25 percent of the unit

Deloit and similar soils
Extent: 5 to 15 percent of the unit

Monona, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

35G—Liston-Burchard complex, 25 to 40 percent slopes

Component Description

Liston and similar soils
Extent: 25 to 50 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes
Slope range: 25 to 40 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.9 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Burchard and similar soils
Extent: 10 to 40 percent of the unit
Geomorphic setting: Hillslopes
Geomorphic component: Head slopes, nose slopes, side slopes
Position on the landform: Backslopes
Slope range: 25 to 40 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.6 inches
Content of organic matter in the upper 10 inches: 3.0 percent

Minor Dissimilar Components

Deloit and similar soils
Extent: 5 to 15 percent of the unit

Monona, moderately eroded, and similar soils
Extent: 5 to 20 percent of the unit

54—Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Zook and similar soils
Extent: 85 to 95 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: At the surface (April)
Deepest depth to wet zone: 3.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 9.6 inches
Content of organic matter in the upper 10 inches: 5.9 percent

Minor Dissimilar Components

Zook, overwash, and similar soils
Extent: 5 to 15 percent of the unit

54+—Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash

Component Description

Zook, overwash, and similar soils
Extent: 85 to 95 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: At the surface (April)
Deepest depth to wet zone: 3.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 9.6 inches
Content of organic matter in the upper 10 inches: 5.9 percent

Minor Dissimilar Components

Zook and similar soils
Extent: 5 to 15 percent of the unit

59D2—Burchard clay loam, 9 to 14 percent slopes, moderately eroded

Component Description

Burchard, moderately eroded, and similar soils
Extent: 50 to 60 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.4 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Burchard, slightly eroded, and similar soils
Extent: 15 to 25 percent of the unit

Liston, slightly eroded, and similar soils
Extent: 5 to 15 percent of the unit

Liston, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

Deloit and similar soils
Extent: 0 to 10 percent of the unit

59E2—Burchard clay loam, 14 to 18 percent slopes, moderately eroded

Component Description

Burchard, moderately eroded, and similar soils
Extent: 50 to 60 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes
Slope range: 14 to 18 percent
Texture of the surface layer: Clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous till
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 9.4 inches
Content of organic matter in the upper 10 inches: 1.7 percent

Minor Dissimilar Components

Burchard, slightly eroded, and similar soils
Extent: 15 to 25 percent of the unit

Liston, slightly eroded, and similar soils
Extent: 5 to 15 percent of the unit

Liston, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

Deloit and similar soils
Extent: 0 to 10 percent of the unit

99C2—Exira silty clay loam, 5 to 9 percent slopes, moderately eroded

Component Description

Exira, moderately eroded, and similar soils
Extent: 70 to 90 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders, summits
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 1.8 percent

Minor Dissimilar Components

Exira, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Marshall, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

99D2—Exira silty clay loam, 9 to 14 percent slopes, moderately eroded

Component Description

Exira, moderately eroded, and similar soils
Extent: 40 to 60 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 1.8 percent

Minor Dissimilar Components

Exira, severely eroded, and similar soils
Extent: 10 to 20 percent of the unit

Adair, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

Marshall, moderately eroded, and similar soils
Extent: 0 to 20 percent of the unit

Shelby, moderately eroded, and similar soils
Extent: 0 to 15 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

99E2—Exira silty clay loam, 14 to 18 percent slopes, moderately eroded

Component Description

Exira, moderately eroded, and similar soils
Extent: 35 to 55 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 14 to 18 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.9 inches
Content of organic matter in the upper 10 inches: 1.8 percent

Minor Dissimilar Components

Exira, severely eroded, and similar soils
Extent: 10 to 40 percent of the unit

Marshall, moderately eroded, and similar soils
Extent: 0 to 20 percent of the unit

Adair, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

Shelby, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

100B—Monona silty clay loam, 2 to 5 percent slopes

Component Description

Monona and similar soils
Extent: 65 to 90 percent of the unit

Geomorphic setting: Loess hills
Position on the landform: Shoulders, summits
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.0 inches
Content of organic matter in the upper 10 inches: 2.7 percent

Minor Dissimilar Components

Monona silty clay loam, moderately eroded, and similar soils
Extent: 10 to 30 percent of the unit

100C2—Monona silty clay loam, 5 to 9 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 40 to 60 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders, summits
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Monona silty clay loam, slightly eroded, and similar soils
Extent: 10 to 50 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

Monona silty clay loam, severely eroded, and similar soils
Extent: 0 to 40 percent of the unit

100D2—Monona silty clay loam, 9 to 14 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 15 to 55 percent of the unit
Geomorphic setting: Loess hills

Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Monona, severely eroded, and similar soils
Extent: 10 to 30 percent of the unit

Ida, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

Monona silty clay loam, slightly eroded, and similar soils
Extent: 10 to 30 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

100D3—Monona silty clay loam, 9 to 14 percent slopes, severely eroded

Component Description

Monona, severely eroded, and similar soils
Extent: 35 to 55 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, backslopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 5 to 55 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 15 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

100E2—Monona silty clay loam, 14 to 20 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 35 to 55 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Monona silty clay loam, severely eroded, and similar soils
Extent: 20 to 40 percent of the unit

Ida, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

Burchard, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

100E3—Monona silty clay loam, 14 to 20 percent slopes, severely eroded

Component Description

Monona, severely eroded, and similar soils
Extent: 30 to 50 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Depth to wet zone: More than 6.7 feet all year
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.8 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 20 to 40 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 30 percent of the unit

Burchard, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

100F2—Monona silty clay loam, 20 to 30 percent slopes, moderately eroded

Component Description

Monona, moderately eroded, and similar soils
Extent: 45 to 65 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 20 to 30 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Monona silty clay loam, severely eroded, and similar soils
Extent: 10 to 40 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 15 percent of the unit

Burchard, moderately eroded, and similar soils
Extent: 0 to 10 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

100F3—Monona silty clay loam, 20 to 30 percent slopes, severely eroded

Component Description

Monona, severely eroded, and similar soils
Extent: 50 to 100 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 20 to 30 percent
Texture of the surface layer: Silty clay loam

Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.7 percent

Minor Dissimilar Components

Ida, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Monona, moderately eroded, and similar soils
Extent: 0 to 30 percent of the unit

Burchard, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

111D3—Dow-Monona complex, 9 to 14 percent slopes, severely eroded

Component Description

Dow, severely eroded, and similar soils
Extent: 40 to 60 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders, summits
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 0.9 percent

Monona, severely eroded, and similar soils
Extent: 30 to 50 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders, summits
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Minor Dissimilar Components

Strahan, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

111E3—Dow-Monona complex, 14 to 20 percent slopes, severely eroded

Component Description

Dow, severely eroded, and similar soils
Extent: 40 to 65 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.1 percent

Monona, severely eroded, and similar soils
Extent: 35 to 60 percent of the unit
Geomorphic setting: Loess hills
Geomorphic component: Nose slopes, head slopes, side slopes
Position on the landform: Backslopes, shoulders, summits
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.2 percent

Minor Dissimilar Components

Strahan, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

125D3—Ida-Chute complex, 9 to 14 percent slopes, severely eroded

Component Description

Ida, severely eroded, and similar soils
Extent: 40 to 75 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Shoulders, backslopes
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None

Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.8 percent

Chute, severely eroded, and similar soils
Extent: 15 to 60 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Shoulders, backslopes
Slope range: 9 to 14 percent
Texture of the surface layer: Loamy fine sand
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Excessively drained
Parent material: Calcareous eolian deposits
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 4.9 inches
Content of organic matter in the upper 10 inches: 0.8 percent

Minor Dissimilar Components

Monona, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

Monona, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

125E3—Ida-Chute complex, 14 to 20 percent slopes, severely eroded

Component Description

Ida, severely eroded, and similar soils
Extent: 40 to 75 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Calcareous loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.6 inches
Content of organic matter in the upper 10 inches: 0.8 percent

Chute, severely eroded, and similar soils
Extent: 15 to 60 percent of the unit
Geomorphic setting: Hillslopes
Position on the landform: Backslopes
Slope range: 14 to 20 percent
Texture of the surface layer: Loamy fine sand
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Excessively drained
Parent material: Calcareous eolian deposits
Flooding: None
Ponding: None

Available water capacity to a depth of 60 inches: 4.9 inches
Content of organic matter in the upper 10 inches: 0.8 percent

Minor Dissimilar Components

Monona, moderately eroded, and similar soils
Extent: 5 to 15 percent of the unit

Monona, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

133—Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Colo and similar soils
Extent: 70 to 95 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: At the surface (April)
Deepest depth to wet zone: 3.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.4 inches
Content of organic matter in the upper 10 inches: 4.0 percent

Minor Dissimilar Components

Colo, overwash, and similar soils
Extent: 0 to 15 percent of the unit

Kennebec and similar soils
Extent: 0 to 10 percent of the unit

133+—Colo silt loam, 0 to 2 percent slopes, occasionally flooded, overwash

Component Description

Colo, overwash, and similar soils
Extent: 75 to 100 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December

Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: At the surface (April)
Deepest depth to wet zone: 3.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Colo and similar soils
Extent: 0 to 15 percent of the unit

Kennebec and similar soils
Extent: 0 to 10 percent of the unit

212—Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Kennebec and similar soils
Extent: 60 to 80 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 4.3 percent

Minor Dissimilar Components

Nodaway and similar soils
Extent: 5 to 20 percent of the unit

Colo, overwash, and similar soils
Extent: 0 to 15 percent of the unit

Zook and similar soils
Extent: 0 to 10 percent of the unit

212+—Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded, overwash

Component Description

Kennebec and similar soils
Extent: 80 to 100 percent of the unit
Geomorphic setting: Flood plains

Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 13.4 inches
Content of organic matter in the upper 10 inches: 4.6 percent

Minor Dissimilar Components

Smithland and similar soils
Extent: 0 to 10 percent of the unit

Danbury and similar soils
Extent: 0 to 5 percent of the unit

Rawles and similar soils
Extent: 0 to 5 percent of the unit

220—Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Nodaway and similar soils
Extent: 65 to 85 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Ackmore and similar soils
Extent: 10 to 30 percent of the unit

Zook and similar soils
Extent: 0 to 10 percent of the unit

266—Smithland silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Smithland and similar soils
Extent: 75 to 95 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 1.0 foot (April)
Deepest depth to wet zone: 4.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.4 inches
Content of organic matter in the upper 10 inches: 6.0 percent

Minor Dissimilar Components

Kennebec and similar soils
Extent: 2 to 15 percent of the unit

Smithland silt loam, overwash, and similar soils
Extent: 2 to 10 percent of the unit

266+—Smithland silt loam, 0 to 2 percent slopes, occasionally flooded, overwash

Component Description

Smithland, overwash, and similar soils
Extent: 60 to 90 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 1.0 foot (April)
Deepest depth to wet zone: 4.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.4 inches
Content of organic matter in the upper 10 inches: 5.2 percent

Minor Dissimilar Components

Rawles and similar soils
Extent: 5 to 15 percent of the unit

Smithland silty clay loam and similar soils
Extent: 5 to 15 percent of the unit

Kennebec and similar soils
Extent: 0 to 10 percent of the unit

268D—Knox silt loam, 9 to 14 percent slopes

Component Description

Knox and similar soils
Extent: 75 to 95 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes, shoulders
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.8 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Knox, moderately eroded, and similar soils
Extent: 0 to 15 percent of the unit

Napier and similar soils
Extent: 0 to 10 percent of the unit

268E—Knox silt loam, 14 to 20 percent slopes

Component Description

Knox and similar soils
Extent: 70 to 95 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes (fig. 10)
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.8 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Knox, moderately eroded, and similar soils
Extent: 0 to 15 percent of the unit

Ida, severely eroded, and similar soils
Extent: 0 to 10 percent of the unit

Figure 10.—A wooded area of Knox silt loam, 14 to 20 percent slopes.

Napier and similar soils
Extent: 0 to 10 percent of the unit

268F—Knox silt loam, 20 to 30 percent slopes

Component Description

Knox and similar soils
Extent: 70 to 95 percent of the unit
Geomorphic setting: Loess hills
Position on the landform: Backslopes
Slope range: 20 to 30 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.8 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Ida, severely eroded, and similar soils
Extent: 0 to 20 percent of the unit

Knox, moderately eroded, and similar soils
Extent: 0 to 15 percent of the unit

Napier and similar soils
Extent: 0 to 10 percent of the unit

430—Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Ackmore and similar soils
Extent: 65 to 85 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Parent material: Alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 1.0 foot (April)
Deepest depth to wet zone: 4.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Nodaway and similar soils
Extent: 10 to 30 percent of the unit

Zook and similar soils
Extent: 0 to 10 percent of the unit

431B—Judson-Ackmore-Colo, overwash, complex, 2 to 5 percent slopes

Component Description

Judson and similar soils
Extent: 45 to 65 percent of the unit
Geomorphic setting: Alluvial fans; drainageways
Position on the landform: Footslopes
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Colluvium
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Ackmore and similar soils
Extent: 15 to 35 percent of the unit
Geomorphic setting: Drainageways
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained

Parent material: Alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Frequent (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 1.0 foot (April)
Deepest depth to wet zone: 4.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Colo, overwash, and similar soils
Extent: 0 to 20 percent of the unit
Geomorphic setting: Drainageways
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Frequent (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: At the surface (April)
Deepest depth to wet zone: 3.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.1 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Nodaway and similar soils
Extent: 0 to 10 percent of the unit

509B—Marshall silty clay loam, terrace, 2 to 5 percent slopes

Component Description

Marshall, terrace, and similar soils
Extent: 80 to 100 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Minor Dissimilar Components

Judson and similar soils
Extent: 0 to 15 percent of the unit

509C—Marshall silty clay loam, terrace, 5 to 9 percent slopes

Component Description

Marshall, terrace, and similar soils
Extent: 75 to 95 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.0 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Minor Dissimilar Components

Judson and similar soils
Extent: 5 to 25 percent of the unit

509C2—Marshall silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded

Component Description

Marshall, terrace, moderately eroded, and similar soils
Extent: 50 to 80 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Marshall, terrace, slightly eroded, and similar soils
Extent: 0 to 25 percent of the unit

Judson and similar soils
Extent: 0 to 25 percent of the unit

509D2—Marshall silty clay loam, terrace, 9 to 14 percent slopes, moderately eroded

Component Description

Marshall, terrace, moderately eroded, and similar soils
Extent: 55 to 75 percent of the unit

Geomorphic setting: Stream terraces
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Marshall, terrace, slightly eroded, and similar soils
Extent: 0 to 25 percent of the unit

Judson and similar soils
Extent: 5 to 25 percent of the unit

509E2—Marshall silty clay loam, terrace, 14 to 20 percent slopes, moderately eroded

Component Description

Marshall, terrace, moderately eroded, and similar soils
Extent: 50 to 80 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 14 to 20 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 11.6 inches
Content of organic matter in the upper 10 inches: 2.2 percent

Minor Dissimilar Components

Marshall, terrace, slightly eroded, and similar soils
Extent: 10 to 30 percent of the unit

Judson and similar soils
Extent: 5 to 25 percent of the unit

510—Monona silt loam, terrace, 0 to 2 percent slopes

Component Description

Monona, terrace, and similar soils
Extent: 100 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess

Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.9 inches
Content of organic matter in the upper 10 inches: 3.4 percent

510B—Monona silt loam, terrace, 2 to 5 percent slopes

Component Description

Monona, terrace, and similar soils
Extent: 50 to 75 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 2 to 5 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.9 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Monona, terrace, moderately eroded, and similar soils
Extent: 25 to 50 percent of the unit

510C2—Monona silt loam, terrace, 5 to 9 percent slopes, moderately eroded

Component Description

Monona, terrace, moderately eroded, and similar soils
Extent: 65 to 85 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 5 to 9 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Monona, terrace, slightly eroded, and similar soils
Extent: 10 to 20 percent of the unit

Napier and similar soils
Extent: 5 to 15 percent of the unit

510D2—Monona silt loam, terrace, 9 to 14 percent slopes, moderately eroded

Component Description

Monona, terrace, moderately eroded, and similar soils
Extent: 65 to 85 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 9 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Monona, terrace, severely eroded, and similar soils
Extent: 5 to 25 percent of the unit

Napier and similar soils
Extent: 0 to 20 percent of the unit

510E2—Monona silt loam, terrace, 14 to 20 percent slopes, moderately eroded

Component Description

Monona, terrace, moderately eroded, and similar soils
Extent: 65 to 85 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 14 to 20 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 2.1 percent

Minor Dissimilar Components

Monona, terrace, severely eroded, and similar soils
Extent: 5 to 25 percent of the unit

Napier and similar soils
Extent: 0 to 20 percent of the unit

630—Danbury silt loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Danbury and similar soils
Extent: 70 to 90 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 2.0 feet (April)
Deepest depth to wet zone: 5.0 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.3 inches
Content of organic matter in the upper 10 inches: 2.7 percent

Minor Dissimilar Components

Kennebec and similar soils
Extent: 10 to 20 percent of the unit

Colo, overwash, and similar soils
Extent: 0 to 10 percent of the unit

670—Rawles silt loam, 0 to 2 percent slopes, occasionally flooded

Component Description

Rawles and similar soils
Extent: 65 to 95 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Calcareous alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Occasional (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 12.5 inches
Content of organic matter in the upper 10 inches: 2.0 percent

Minor Dissimilar Components

Danbury and similar soils
Extent: 5 to 25 percent of the unit

Smithland, overwash, and similar soils
Extent: 0 to 10 percent of the unit

700—Monona silty clay loam, terrace, 0 to 2 percent slopes

Component Description

Monona, terrace, and similar soils
Extent: 100 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 0 to 2 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.9 inches
Content of organic matter in the upper 10 inches: 3.4 percent

700B—Monona silty clay loam, terrace, 2 to 5 percent slopes

Component Description

Monona, terrace, and similar soils
Extent: 70 to 80 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 2 to 5 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.9 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Minor Dissimilar Components

Monona, terrace, moderately eroded, and similar soils
Extent: 20 to 30 percent of the unit

700C2—Monona silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded

Component Description

Monona, terrace, moderately eroded, and similar soils
Extent: 30 to 70 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained

Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Monona, terrace, slightly eroded, and similar soils
Extent: 10 to 50 percent of the unit

Monona, terrace, severely eroded, and similar soils
Extent: 5 to 25 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

700D2—Monona silty clay loam, terrace, 9 to 14 percent slopes, moderately eroded

Component Description

Monona, terrace, moderately eroded, and similar soils
Extent: 50 to 70 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 9 to 14 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Loess
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 12.7 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Monona, terrace, slightly eroded, and similar soils
Extent: 15 to 40 percent of the unit

Monona, terrace, severely eroded, and similar soils
Extent: 5 to 15 percent of the unit

Judson and similar soils
Extent: 0 to 10 percent of the unit

717D—Napier-Gullied land complex, 5 to 14 percent slopes

Component Description

Napier and similar soils
Extent: 30 to 70 percent of the unit
Geomorphic setting: Drainageways
Position on the landform: Toeslopes
Slope range: 5 to 14 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained

Parent material: Local alluvium
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.1 inches
Content of organic matter in the upper 10 inches: 3.4 percent

Gullied land
Extent: 25 to 45 percent of the unit
Geomorphic setting: Drainageways
Position on the landform: Toeslopes, footslopes
Slope range: 5 to 14 percent
Months in which flooding does not occur: January, December
Highest frequency of flooding: Frequent (February, March, April, May, June, July, August, September, October, November)
Ponding: None

Minor Dissimilar Components

Kennebec and similar soils
Extent: 5 to 15 percent of the unit

Nodaway and similar soils
Extent: 0 to 10 percent of the unit

740D—Hawick gravelly sandy loam, 9 to 14 percent slopes

Component Description

Hawick and similar soils
Extent: 75 to 95 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 9 to 14 percent
Texture of the surface layer: Gravelly sandy loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Excessively drained
Parent material: Sandy outwash sediments
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 3.1 inches
Content of organic matter in the upper 10 inches: 1.4 percent

Minor Dissimilar Components

Judson and similar soils
Extent: 0 to 15 percent of the unit

Liston, slightly eroded, and similar soils
Extent: 0 to 10 percent of the unit

740E—Hawick gravelly sandy loam, 14 to 18 percent slopes

Component Description

Hawick and similar soils
Extent: 75 to 100 percent of the unit
Geomorphic setting: Stream terraces

Slope range: 14 to 18 percent
Texture of the surface layer: Gravelly sandy loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Excessively drained
Parent material: Sandy outwash sediments
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 3.1 inches
Content of organic matter in the upper 10 inches: 1.4 percent

Minor Dissimilar Components

Judson and similar soils
Extent: 0 to 15 percent of the unit

Liston, slightly eroded, and similar soils
Extent: 0 to 10 percent of the unit

740F—Hawick gravelly sandy loam, 18 to 25 percent slopes

Component Description

Hawick and similar soils
Extent: 75 to 100 percent of the unit
Geomorphic setting: Stream terraces
Slope range: 18 to 25 percent
Texture of the surface layer: Gravelly sandy loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Excessively drained
Parent material: Sandy outwash sediments
Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 3.1 inches
Content of organic matter in the upper 10 inches: 1.4 percent

Minor Dissimilar Components

Judson and similar soils
Extent: 0 to 15 percent of the unit

Liston, slightly eroded, and similar soils
Extent: 0 to 10 percent of the unit

980C—Judson-Gullied land complex, 5 to 9 percent slopes

Component Description

Judson and similar soils
Extent: 40 to 70 percent of the unit
Geomorphic setting: Drainageways
Position on the landform: Footslopes
Slope range: 5 to 9 percent
Texture of the surface layer: Silty clay loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Well drained
Parent material: Colluvium

Flooding: None
Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 3.5 percent

Gullied land
Extent: 20 to 45 percent of the unit
Geomorphic setting: Drainageways
Position on the landform: Toeslopes, footslopes
Slope range: 5 to 9 percent
Months in which flooding does not occur: January, December
Highest frequency of flooding: Frequent (February, March, April, May, June, July, August, September, October, November)
Ponding: None

Minor Dissimilar Components

Ackmore and similar soils
Extent: 0 to 20 percent of the unit

1220—Nodaway silt loam, channeled, 0 to 2 percent slopes, frequently flooded

Component Description

Nodaway, channeled, frequently flooded, and similar soils
Extent: 70 to 90 percent of the unit
Geomorphic setting: Flood plains
Slope range: 0 to 2 percent
Texture of the surface layer: Silt loam
Depth to restrictive feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Parent material: Silty alluvium
Months in which flooding does not occur: January, December
Highest frequency of flooding: Frequent (February, March, April, May, June, July, August, September, October, November)
Shallowest depth to wet zone: 4.0 feet (April)
Deepest depth to wet zone: More than 6.7 feet (September)
Ponding: None
Available water capacity to a depth of 60 inches: 13.2 inches
Content of organic matter in the upper 10 inches: 1.9 percent

Minor Dissimilar Components

Danbury, channeled, frequently flooded, and similar soils
Extent: 5 to 15 percent of the unit

Fluvaquents, channeled, frequently flooded, and similar soils
Extent: 5 to 15 percent of the unit

5010—Pits, sand and gravel

Component Description

Pits, sand and gravel
Definition: This map unit consists of areas from which sand and gravel have been removed.

Extent: 100 percent of the unit
Ponding: None

5040—Udorthents, loamy

Component Description

Udorthents, loamy, and similar soils
Extent: 100 percent of the unit
Geomorphic setting: Hillslopes
Depth to restrictive feature: Very deep (more than 60 inches)
Flooding: None
Ponding: None

5080—Udorthents, sanitary landfill

Component Description

Udorthents
Extent: 100 percent of the unit
Ponding: None

AW—Animal waste lagoon

- This map unit consists of shallow ponds constructed to hold animal waste from farm feedlots.

SL—Sewage lagoon

- This map unit consists of shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid waste.

W—Water

- This map unit consists of natural bodies of water.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2003). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udoll (*Ud*, meaning humid, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludolls (*Hapl*, meaning minimal horizonation, plus *udoll*, the suborder of the Mollisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, superactive, mesic Typic Hapludolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

The table “Classification of the Soils” in Part II of this publication indicates the order, suborder, great group, subgroup, and family of the soil series in the survey area.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 2003). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Ackmore Series

Typical Pedon

Ackmore silt loam, 0 to 2 percent slopes, on a nearly level flood plain, in a pastured area; in Warren County, Iowa; about 2 miles southeast of Bevington; about 2,230 feet west and 275 feet south of the northeast corner of sec. 5, T. 75 N., R. 25 W.; USGS St. Charles topographic quadrangle; lat. 41 degrees 20 minutes 12 seconds N. and long. 93 degrees 45 minutes 34 seconds W., NAD 83:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; moderately acid; abrupt smooth boundary.

C—6 to 25 inches; stratified very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) silt loam; massive with weak thin alluvial stratification; friable; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; clear smooth boundary.

Ab1—25 to 30 inches; black (10YR 2/1) silty clay loam; weak fine subangular blocky structure parting to weak fine granular; friable; moderately acid; clear smooth boundary.

Ab2—30 to 44 inches; black (10YR 2/1) silty clay loam; weak medium prismatic structure parting to moderate very fine and fine subangular blocky; friable; few fine dark iron-manganese masses; slightly acid; clear smooth boundary.

Ab3—44 to 60 inches; black (10YR 2/1) silty clay loam; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine dark iron-manganese masses; neutral.

Range in Characteristics

Depth to buried horizons: 20 to 40 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

C horizon:
Hue—10YR
Value—2 to 5
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

Ab horizon:
Hue—10YR or N
Value—2 to 4
Chroma—0 to 2
Texture—silty clay loam or silt loam
Reaction—moderately acid to slightly alkaline

Bb horizon (if it occurs):
Hue—10YR
Value—3 or 4
Chroma—1 or 2
Texture—silty clay loam
Reaction—slightly acid to slightly alkaline

Adair Series

Typical Pedon

Adair clay loam, in an area of Shelby-Adair complex, 9 to 14 percent slopes, moderately eroded, in a cultivated field in the uplands; in Shelby County, Iowa; 2,100 feet east and 75 feet north of the southwest corner of sec. 15, T. 80 N., R. 37 W.; USGS Jacksonville topographic quadrangle; lat. 41 degrees 43 minutes 55.3 seconds N. and long. 95 degrees 08 minutes 38.9 seconds W., NAD 83:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) clay loam, brown (10YR 5/3) dry; weak fine granular structure; friable; many very fine roots; common very fine tubular pores; few fine prominent yellowish brown (10YR 5/6) iron masses; neutral; clear smooth boundary.

2Bt1—6 to 18 inches; strong brown (7.5YR 4/6) clay loam; weak fine subangular blocky structure; firm; few very fine roots; many very fine tubular pores; few prominent dark grayish brown (10YR 4/2) clay films on faces of peds; about 2 percent gravel; slightly acid; gradual smooth boundary.

2Bt2—18 to 33 inches; dark yellowish brown (10YR 4/6) and yellowish red (5YR 4/6) clay; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; very firm; few very fine roots; many very fine tubular pores; few prominent dark grayish brown (10YR 4/2) clay films on faces of peds; common fine prominent light brownish gray (2.5Y 6/2) redoximorphic depletions; about 2 percent gravel; moderately acid; gradual smooth boundary.

2Bt3—33 to 56 inches; dark yellowish brown (10YR 4/6) clay loam; weak fine and medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; many very fine tubular pores; few prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine prominent black (10YR 2/1) manganese masses; common fine and medium prominent light brownish gray (2.5Y 6/2) redoximorphic depletions; about 2 percent gravel; slightly acid; gradual smooth boundary.

2BC—56 to 69 inches; dark yellowish brown (10YR 4/6) clay loam; weak medium prismatic structure; friable; many very fine tubular pores; common fine prominent black (10YR 2/1) manganese masses; many medium prominent light brownish gray (2.5Y 6/2) redoximorphic depletions; about 2 percent gravel; slightly acid; gradual smooth boundary.

2C—69 to 80 inches; dark yellowish brown (10YR 4/6) clay loam; massive; friable; many very fine tubular pores; few fine prominent black (10YR 2/1) manganese masses; many medium and coarse prominent light brownish gray (2.5Y 6/2) redoximorphic depletions; about 2 percent gravel; slightly acid.

Range in Characteristics

Ap or A horizon:
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam, clay loam, or silt loam
Reaction—moderately acid to neutral

2Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 5
Chroma—3 to 6
Texture—clay or clay loam
Reaction—strongly acid to slightly acid

2BC horizon:
Hue—2.5YR to 10YR
Value—3 to 5
Chroma—3 to 6
Texture—clay loam
Reaction—moderately acid to slightly alkaline

2C horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 6
Texture—clay loam
Reaction—moderately acid to slightly alkaline

Taxadjunct features: The typical pedon does not have a mollic epipedon. This soil is classified as a fine, smectitic, mesic Oxyaquic Vertic Hapludalf.

Burchard Series

Typical Pedon

Burchard clay loam (fig. 11), 14 to 18 percent slopes, moderately eroded, in a pasture in the uplands; in Crawford County, Iowa; 500 feet south and 140 feet west of the northeast corner of sec. 29, T. 85 N., R. 38 W.; USGS Kiron topographic quadrangle; lat. 42 degrees 09 minutes 07 seconds N. and long. 95 degrees 17 minutes 06 seconds W., NAD 83:

A1—0 to 6 inches; very dark brown (10YR 2/2) clay loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; friable; few fine and very fine roots; many very fine and fine tubular pores; about 2 percent rock fragments; slightly acid; clear smooth boundary.

A2—6 to 12 inches; very dark brown (10YR 2/2) clay loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; friable; few fine and very fine roots; many very fine and fine tubular pores; common distinct black (10YR 2/1) organic coats on faces of peds; neutral; clear smooth boundary.

Bt—12 to 20 inches; brown (10YR 4/3) clay loam; moderate fine subangular blocky structure parting to moderate fine granular; friable; few fine and very fine roots; many very fine and fine tubular pores; few distinct clay films on faces of peds; few distinct very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) organic coats on faces of peds; about 2 percent rock fragments; neutral; clear smooth boundary.

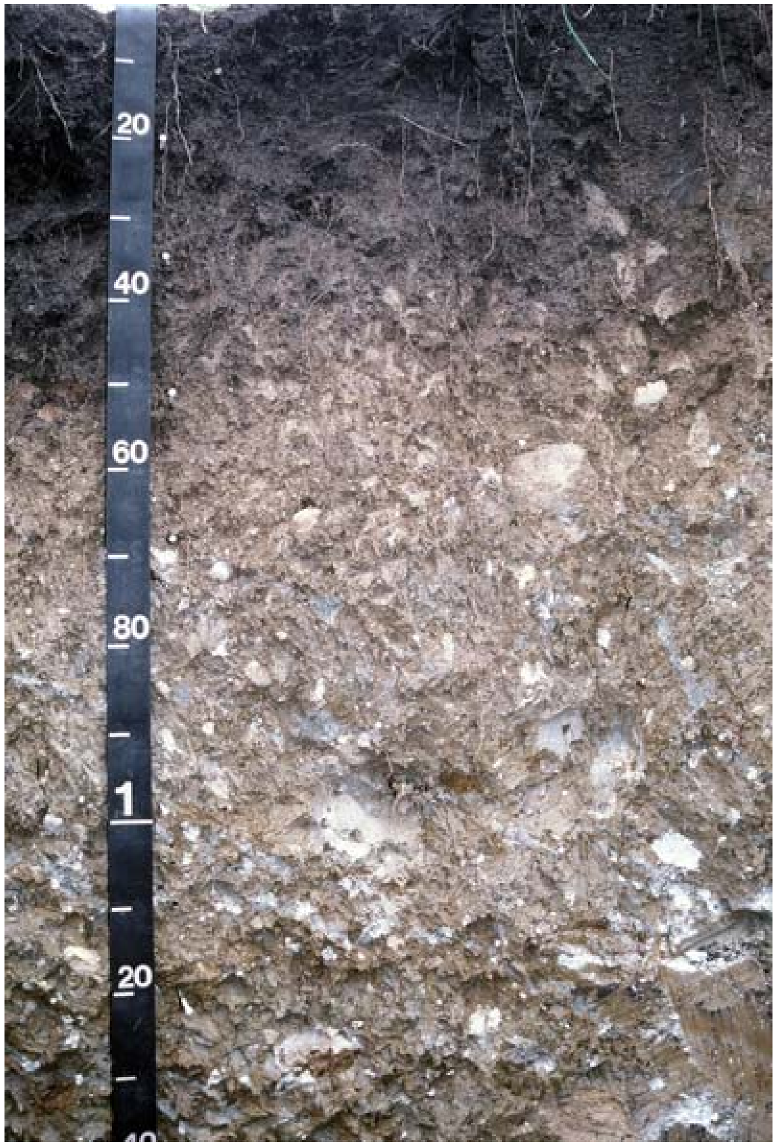

Figure 11.—Profile of Burchard clay loam.

Btk1—20 to 28 inches; yellowish brown (10YR 5/4) clay loam; moderate fine subangular blocky structure; friable; few fine and very fine roots; common very fine and fine tubular pores; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine irregular very pale brown (10YR 8/2) calcium carbonate concretions; about 2 percent rock fragments; strongly effervescent; slightly alkaline; clear smooth boundary.

Btk2—28 to 43 inches; yellowish brown (10YR 5/6) clay loam; moderate fine subangular blocky structure; firm; few very fine roots; common very fine and fine tubular pores; few distinct yellowish brown (10YR 5/4) clay films on faces of peds; few fine irregular very pale brown (10YR 8/2) calcium carbonate concretions; about 2 percent rock fragments; strongly effervescent; slightly alkaline; gradual smooth boundary.

Btk3—43 to 53 inches; about 60 percent yellowish brown (10YR 5/4) and 40 percent grayish brown (2.5Y 5/2) clay loam; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; common very fine and fine tubular pores;

few distinct yellowish brown (10YR 5/4) clay films on faces of peds; few fine irregular very pale brown (10YR 8/2) calcium carbonate concretions; about 2 percent rock fragments; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk—53 to 80 inches; mottled yellowish brown (10YR 5/4) and grayish brown (2.5Y 5/2) clay loam; moderate fine prismatic structure; firm; few fine irregular very pale brown (10YR 8/2) calcium carbonate concretions; about 2 percent rock fragments; strongly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 12 to 30 inches

A or Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam, silt loam, or clay loam
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR
Value—3 to 6
Chroma—2 to 6
Texture—clay loam
Reaction—slightly acid or neutral

Btk horizon:
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—2 to 6
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

Bk horizon:
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—2 to 6
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

Chute Series

Typical Pedon

Chute loamy fine sand, on an east-facing, convex slope of 35 percent; in a wooded area; in Peoria County, Illinois; about 6$^{1}/_{2}$ miles west of Peoria; 300 feet east and 1,400 feet south of the northwest corner of sec. 28, T. 9 N., R. 7 E.; USGS Peoria West topographic quadrangle; lat. 40 degrees 44 minutes 10 seconds N. and long. 89 degrees 43 minutes 03 seconds W.

A—0 to 4 inches; dark brown (10YR 3/3) loamy fine sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; few very fine roots; few brown (10YR 4/3) soil fragments and wormcasts; slightly alkaline; clear wavy boundary.

AC—4 to 11 inches; dark yellowish brown (10YR 4/4) fine sand; weak medium subangular blocky structure; very friable; few very fine roots; common distinct dark brown (10YR 3/3) organic coatings on faces of peds; slightly effervescent; slightly alkaline; clear smooth boundary.

C—11 to 60 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; strongly effervescent; moderately alkaline.

Range in Characteristics

A or Ap horizon:
Hue—10YR
Value—3 to 5; 3 to 6 in eroded areas
Chroma—2 or 3; 3 or 4 in eroded areas
Texture—loamy fine sand, fine sandy loam, fine sand, or sand
Reaction—neutral to moderately alkaline

AC horizon:
Hue—10YR
Value—3 to 6
Chroma—3 to 6
Texture—loamy fine sand or fine sand
Reaction—neutral to moderately alkaline

C horizon:
Hue—10YR
Value—5 or 6
Chroma—3 to 6
Texture—fine sand, loamy fine sand, or sand
Reaction—slightly alkaline or moderately alkaline

Colo Series

Typical Pedon

Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain; in Crawford County, Iowa; 300 feet east and 2,540 feet north of the southwest corner of sec. 1, T. 84 N., R. 37 W.; USGS Arcadia topographic quadrangle; lat. 42 degrees 06 minutes 54.9 seconds N. and long. 95 degrees 06 minutes 34.7 seconds W., NAD 83:

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine and medium granular structure; friable; many fine roots; many fine tubular pores; slightly acid; abrupt smooth boundary.

A1—6 to 14 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine and medium subangular blocky structure parting to weak fine and medium granular; friable; many fine roots; many fine tubular pores; neutral; gradual smooth boundary.

A2—14 to 26 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine and medium subangular blocky structure; friable; many fine roots; many fine tubular pores; neutral; gradual smooth boundary.

A3—26 to 37 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine and medium subangular blocky structure; friable; common fine roots; many fine tubular pores; neutral; diffuse smooth boundary.

A4—37 to 48 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine and medium subangular blocky structure; friable; few fine roots; few fine tubular pores; neutral; diffuse smooth boundary.

Bg—48 to 62 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few fine roots; few fine tubular pores; common distinct black (10YR 2/1) coats on faces of prisms; neutral; diffuse smooth boundary.

Cg—62 to 80 inches; very dark gray (10YR 3/1) silty clay loam; massive; friable; neutral.

Range in Characteristics

Thickness of the mollic epipedon: More than 36 inches
Depth to carbonates: More than 60 inches

Ap or A horizon:
Hue—10YR or N; 10YR in overwash phase
Value—2 or 3; 3 to 5 in overwash phase
Chroma—0 to 2; 1 or 2 in overwash phase
Texture—silty clay loam; silt loam or silty clay loam in overwash phase
Reaction—moderately acid to neutral; slightly acid to moderately alkaline in overwash phase

Bg horizon:
Hue—10YR or 2.5Y
Value—2 to 4
Chroma—1
Texture—silty clay loam
Reaction—moderately acid to neutral

Cg horizon:
Hue—10YR to 5Y
Value—3 to 6
Chroma—1 or 2
Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

Danbury Series

Typical Pedon

Danbury silt loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain; in Woodbury County, Iowa; 1,700 feet north and 500 feet west of the southeast corner of sec. 23, T. 88 N., R. 42 W.; USGS Cushing topographic quadrangle; lat. 42 degrees 25 minutes 34.1 seconds N. and long. 95 degrees 41 minutes 27.2 seconds W., NAD 83:

Ap—0 to 7 inches; about 95 percent very dark grayish brown (10YR 3/2) and 5 percent dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; friable; common fine roots; many very fine pores; moderately acid; abrupt smooth boundary.
C1—7 to 15 inches; about 90 percent very dark grayish brown (10YR 3/2) and 10 percent dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; massive with weak thin alluvial stratification; friable; few very fine roots; many very fine pores; neutral; clear smooth boundary.
C2—15 to 25 inches; about 95 percent very dark grayish brown (10YR 3/2) and 5 percent dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; massive with weak thin alluvial stratification; friable; few very fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.
C3—25 to 32 inches; about 95 percent very dark grayish brown (10YR 3/2) and 5 percent dark grayish brown (10YR 4/2) silt loam, brown (10YR 5/3) dry; massive with weak thin alluvial stratification; friable; few very fine roots; many very fine and

fine tubular pores; common fine distinct yellowish brown (10YR 5/4) redoximorphic concentrations; neutral; abrupt wavy boundary.

2Ab1—32 to 43 inches; black (10YR 2/1) silty clay loam; weak very fine subangular blocky structure; friable; many very fine and fine tubular pores; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; neutral; gradual smooth boundary.

2Ab2—43 to 53 inches; black (10YR 2/1) silty clay loam; weak very fine and fine subangular blocky structure; friable; many very fine and fine tubular pores; common fine distinct brown (10YR 4/3) redoximorphic concentrations; neutral; gradual smooth boundary.

2Ab3—53 to 64 inches; black (10YR 2/1) silty clay loam, weak fine subangular blocky structure; friable; many very fine and fine tubular pores; common fine distinct brown (10YR 4/3) redoximorphic concentrations; neutral; clear smooth boundary.

2Bwb1—64 to 71 inches; very dark gray (10YR 3/1) silty clay loam; weak very fine prismatic structure parting to weak fine subangular blocky; friable; many very fine and fine tubular pores; common fine distinct brown (10YR 4/3) redoximorphic concentrations; neutral; clear smooth boundary.

2Bwb2—71 to 80 inches; very dark gray (10YR 3/1) silty clay loam; moderate very fine prismatic structure parting to weak fine subangular blocky; friable; many very fine and fine tubular pores; common fine distinct brown (10YR 4/3) redoximorphic concentrations; neutral.

Range in Characteristics

Depth to carbonates: More than 52 inches
Depth to buried horizon: 20 to 40 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

C horizon:
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

2Ab horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

2Bwb horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 to 3
Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

Deloit Series

Typical Pedon

Deloit loam, 5 to 9 percent slopes, in a pastured area in the uplands; in Woodbury County, Iowa; 2,050 feet west and 900 feet north of the southeast corner of sec. 1, T. 89 N., R. 42 W.; USGS Washta topographic quadrangle; lat. 42 degrees 32 minutes 59 seconds N. and long. 95 degrees 44 minutes 56.8 seconds W., NAD 83:

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure parting to weak fine granular; friable; common fine roots; common fine tubular pores; neutral; abrupt smooth boundary.

A1—8 to 18 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; weak very fine subangular blocky structure parting to weak very fine and fine granular; friable; few very fine and fine roots; common very fine and fine tubular pores; many distinct black (10YR 2/1) organic coats on vertical faces of peds; slightly acid; gradual smooth boundary.

A2—18 to 30 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; weak very fine and fine subangular blocky structure; friable; few very fine and fine roots; common very fine and fine tubular pores; many distinct black (10YR 2/1) organic coats on vertical faces of peds; slightly acid; gradual smooth boundary.

A3—30 to 40 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; weak very fine and fine subangular blocky structure; friable; few very fine and fine roots; common very fine and fine tubular pores; many distinct very dark brown (10YR 2/2) organic coats on vertical faces of peds; slightly acid; clear smooth boundary.

AB—40 to 50 inches; dark brown (10YR 3/3) clay loam, dark grayish brown (10YR 4/2) dry; weak very fine prismatic structure parting to weak fine subangular blocky; friable; few very fine and fine roots; common very fine and fine tubular pores; many distinct very dark grayish brown (10YR 3/2) organic coats on vertical faces of peds; slightly acid; gradual smooth boundary.

Bw1—50 to 61 inches; brown (10YR 4/3) clay loam; weak fine prismatic structure parting to weak fine and medium subangular blocky; friable; common very fine and fine tubular pores; many distinct very dark grayish brown (10YR 3/2) organic coats on vertical faces of peds; slightly acid; gradual smooth boundary.

Bw2—61 to 69 inches; brown (10YR 4/3) clay loam; weak fine prismatic structure parting to weak medium subangular blocky; friable; common very fine and fine tubular pores; common distinct very dark grayish brown (10YR 3/2) organic coats on vertical faces of peds; slightly acid; gradual smooth boundary.

Bw3—69 to 80 inches; brown (10YR 4/3) loam; weak medium prismatic structure parting to weak coarse subangular blocky; friable; common very fine and fine tubular pores; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 55 inches
Depth to carbonates: More than 50 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam or clay loam
Reaction—moderately acid to neutral

AB horizon:
Hue—10YR
Value—3
Chroma—2 or 3
Texture—loam or clay loam
Reaction—slightly acid to slightly alkaline

Bw horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—loam, clay loam, or silt loam
Reaction—slightly acid to slightly alkaline

Bt or Bk horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—loam, clay loam, or silt loam
Reaction—slightly acid to slightly alkaline

Dow Series

Typical Pedon

Dow silt loam, 9 to 14 percent slopes, moderately eroded, in a cultivated field in the uplands; in Crawford County, Iowa; 2,525 feet north and 410 feet west of the southeast corner of sec. 31, T. 82 N., R. 40 W.; USGS Dunlap NE topographic quadrangle; lat. 41 degrees 52 minutes 13.6 seconds N. and long. 95 degrees 32 minutes 21.9 seconds W., NAD 83:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure parting to weak fine granular; friable; common fine and very fine roots; few fine and very fine tubular pores; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—6 to 15 inches; grayish brown (2.5Y 5/2) silt loam; massive; very friable; common fine and very fine roots; few fine and very fine tubular pores; few distinct brown (10YR 4/3) organic stains along cleavage planes; few fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—15 to 21 inches; light brownish gray (2.5Y 6/2) silt loam; massive; very friable; few very fine roots; few very fine tubular pores; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

C3—21 to 80 inches; light brownish gray (2.5Y 6/2) silt loam; massive; very friable; few very fine tubular pores; few fine prominent strong brown (7.5YR 5/6) and reddish brown (5YR 4/4) redoximorphic concentrations; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: Less than 10 inches

A horizon:
Hue—10YR
Value—2 or 3

Chroma—2
Texture—silt loam
Reaction—neutral to moderately alkaline

Ap horizon:
Hue—10YR
Value—3 to 5
Chroma—2 or 3
Texture—silt loam
Reaction—neutral to moderately alkaline

C horizon:
Hue—10YR to 5Y
Value—5 or 6
Chroma—2
Texture—silt loam
Reaction—moderately alkaline or slightly alkaline
Note—redoximorphic features are considered relict and include high-chroma concentrations, pipestems, or concretions that are high in iron.

Exira Series

Typical Pedon

Exira silty clay loam (fig. 12), 5 to 9 percent slopes, moderately eroded, in a cultivated field in the uplands; in Crawford County, Iowa; 1,550 feet north and 650 feet east of the southwest corner of sec. 12, T. 83 N., R. 37 W.; USGS Arcadia topographic quadrangle; lat. 42 degrees 47.3 seconds N. and long. 95 degrees 06 minutes 30.4 seconds W., NAD 83:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; common fine and very fine roots; common fine and very fine tubular pores; slightly acid; abrupt smooth boundary.

A—7 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam; few brown (10YR 4/3) mixings in the lower part; dark grayish brown (10YR 4/2) dry; moderate medium and fine subangular blocky structure; friable; common fine and very fine roots; common fine and very fine tubular pores; slightly acid; clear smooth boundary.

Bw1—12 to 17 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure parting to moderate fine subangular blocky; friable; few fine and very fine roots; few fine and very fine tubular pores; many prominent very dark grayish brown (10YR 3/2) organic coats on faces of peds; slightly acid; clear smooth boundary.

Bw2—17 to 24 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; few very fine tubular pores; common fine distinct dark yellowish brown (10YR 4/6) redoximorphic concentrations; slightly acid; clear smooth boundary.

Bw3—24 to 31 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure; friable; few very fine roots; few very fine tubular pores; common fine distinct grayish brown (2.5Y 5/2) redoximorphic depletions; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid; clear smooth boundary.

Bw4—31 to 43 inches; brown (10YR 4/3) silty clay loam; weak medium prismatic structure; friable; few very fine roots; few very fine tubular pores; many fine faint light brownish gray (10YR 6/2) redoximorphic depletions; common fine distinct yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5 YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Figure 12.—Profile of Exira silty clay loam.

C1—43 to 56 inches; about 60 percent yellowish brown (10YR 5/4) and 40 percent light brownish gray (2.5Y 6/2) silty clay loam; massive; friable; few very fine roots;

few very fine tubular pores; common fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; gradual smooth boundary.

C2—56 to 66 inches; about 55 percent brownish gray (2.5Y 6/2) and 45 percent yellowish brown (10YR 5/4) silty clay loam; massive; friable; few very fine tubular pores; common fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; diffuse smooth boundary.

C3—66 to 75 inches; about 70 percent brownish gray (2.5Y 6/2) and 30 percent yellowish brown (10YR 5/4) silty clay loam; massive; friable; few very fine tubular pores; common fine prominent strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) redoximorphic concentrations; neutral; diffuse smooth boundary.

C4—75 to 80 inches; about 70 percent brownish gray (2.5Y 6/2) and 30 percent yellowish brown (10YR 5/4) silt loam; massive; friable; common fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 16 inches
Depth to carbonates: More than 40 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—silty clay loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3
Texture—silty clay loam or silt loam
Reaction—moderately acid or slightly acid
Note—redoximorphic features are considered relict

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 4
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral
Note—redoximorphic features are considered relict

Taxadjunct features: The Exira soils in Crawford County are taxadjuncts because the surface layer does not meet the thickness requirements for a Mollisol.

Hawick Series

Typical Pedon

Hawick gravelly sandy loam, 14 to 18 percent slopes, in a cultivated field in the uplands; in Crawford County, Iowa; 2,480 feet north and 320 feet west of the southeast corner of sec. 2, T. 83 N., R. 38 W.; USGS Vail topographic quadrangle; lat. 42 degrees 01 minute 50 seconds N. and long. 95 degrees 13 minutes 42.4 seconds W., NAD 83:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; very friable; many very fine and fine roots; many very fine and fine interstitial pores;

about 16 percent rock fragments; strongly effervescent; slightly alkaline; abrupt smooth boundary.

AC—7 to 10 inches; dark brown (10YR 3/3) gravelly loamy coarse sand; single grain; loose; common very fine roots; about 30 percent rock fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—10 to 30 inches; yellowish brown (10YR 5/4) gravelly coarse sand; single grain; loose; few very fine roots; common fine very pale brown (10YR 8/2) carbonate coats on rock fragments below a depth of 22 inches; about 27 percent rock fragments; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—30 to 80 inches; yellowish brown (10YR 5/4) coarse sand; single grain; loose; common fine very pale brown (10YR 8/2) carbonate coats on rock fragments; about 10 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 0 to 30 inches
Thickness of the mollic epipedon: 7 to 16 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—gravelly sandy loam
Reaction—slightly acid to slightly alkaline

Bw horizon (if it occurs):
Hue—7.5YR, 10YR, or 2.5Y
Value—3 to 5
Chroma—3 or 4
Texture—gravelly loamy coarse sand or coarse sand
Reaction—slightly acid to slightly alkaline

C horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—gravelly coarse sand, gravelly loamy coarse sand, or coarse sand
Reaction—slightly alkaline or moderately alkaline

Ida Series

Typical Pedon

Ida silt loam, 5 to 9 percent slopes, severely eroded, in a cultivated field in the uplands; in Crawford County, Iowa; 150 feet north and 2,400 feet west of the southeast corner of sec. 7, T. 85 N., R. 41 W.; USGS Danbury topographic quadrangle; lat. 42 degrees 10 minutes 57.6 seconds N. and long. 95 degrees 39 minutes 41.3 seconds W., NAD 83:

Ap—0 to 6 inches; about 90 percent brown (10YR 4/3) and 10 percent brown (10YR 5/3) silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; friable; common very fine and fine roots; few tubular pores; dark brown (10YR 3/3) organic coats on faces of peds; few fine and medium irregular carbonate concretions; few fine faint brown (7.5YR 4/4) relict redoximorphic concentrations; strongly effervescent; slightly alkaline; clear smooth boundary.

C1—6 to 12 inches; brown (10YR 5/3) silt loam; massive; friable; few fine roots; common fine tubular pores; dark brown (10YR 3/3) organic coats; common fine

and medium irregular carbonate concretions; few fine faint brown (7.5YR 4/4) relict redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—12 to 18 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine roots; common fine tubular pores; common fine and medium irregular carbonate concretions; few fine irregular very dark brown (7.5YR 2/2) masses of manganese; few fine distinct grayish brown (10YR 5/2) relict redoximorphic depletions; few fine distinct yellowish brown (10YR 5/6) relict redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

C3—18 to 25 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine roots; common fine tubular pores; few fine irregular carbonate concretions; few fine irregular very dark brown (7.5YR 2/2) masses of manganese; common coarse distinct light brownish gray (10YR 6/2) relict redoximorphic depletions; common coarse distinct yellowish brown (10YR 5/6) and few fine distinct strong brown (7.5YR 5/6) relict redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

C4—25 to 31 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine roots; common fine tubular pores; few fine irregular carbonate concretions; few fine irregular very dark brown (7.5YR 2/2) masses of manganese; common coarse distinct light brownish gray (10YR 6/2) relict redoximorphic depletions; common coarse distinct yellowish brown (10YR 5/6) and few fine distinct strong brown (7.5YR 5/6) relict redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

C5—31 to 46 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; common fine tubular pores; few fine irregular carbonate concretions; few fine irregular very dark brown (7.5YR 2/2) masses of manganese; common coarse distinct light brownish gray (2.5Y 6/2) relict redoximorphic depletions; common coarse distinct strong brown (7.5YR 5/6) relict redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

C6—46 to 71 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; common fine tubular pores; few fine irregular dark brown (7.5YR 3/2) masses of manganese; common coarse distinct light brownish gray (2.5Y 6/2) relict redoximorphic depletions; common coarse distinct strong brown (7.5YR 5/6) relict redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

C7—71 to 80 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine irregular dark brown (7.5YR 3/2) masses of manganese; common coarse distinct light brownish gray (2.5Y 6/2) relict redoximorphic depletions; common coarse distinct strong brown (7.5YR 5/6) relict redoximorphic concentrations; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 0 to 10 inches
Note: The redoximorphic features described in this pedon are considered relict.

Ap or A horizon:
Hue—10YR
Value—3 to 5
Chroma—2 or 3
Texture—silt loam
Reaction—neutral to moderately alkaline

C horizon:
Hue—10YR or 2.5Y
Value—4 or 5

Chroma—3 to 6
Texture—silt loam
Reaction—slightly alkaline or moderately alkaline

Judson Series

Typical Pedon

Judson silty clay loam, 2 to 5 percent slopes, in a cultivated field in an upland drainageway; in Crawford County, Iowa; 1,850 feet north and 220 feet west of the southeast corner of sec. 22, T. 82 N., R. 38 W.; USGS Manilla topographic quadrangle; lat. 41 degrees 53 minutes 52.3 seconds N. and long. 95 degrees 14 minutes 52.5 seconds W., NAD 83:

Ap—0 to 9 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure parting to moderate fine granular; friable; many very fine and fine roots; common very fine tubular pores; many distinct black (10YR 2/1) organic stains on faces of peds and in pores; moderately acid; abrupt smooth boundary.

A1—9 to 20 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; moderate fine and medium subangular blocky structure parting to weak fine granular; friable; many very fine roots; many very fine and fine tubular pores; many distinct black (10YR 2/1) organic stains on faces of peds and in pores; slightly acid; gradual smooth boundary.

A2—20 to 29 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; moderate fine and medium subangular blocky structure; friable; many very fine roots; many very fine and fine tubular pores; many distinct black (10YR 2/1) organic stains on faces of peds and in pores; slightly acid; gradual smooth boundary.

AB—29 to 37 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium subangular blocky structure; friable; many very fine roots; many very fine and fine tubular pores; common distinct very dark brown (10YR 2/2) organic stains on faces of peds and in pores; neutral; gradual smooth boundary.

Bw1—37 to 52 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; friable; common very fine roots; many very fine and fine tubular pores; many distinct very dark grayish brown (10YR 3/2) organic stains on faces of peds and in pores; neutral; gradual smooth boundary.

Bw2—52 to 61 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common very fine roots; many very fine and fine tubular pores; neutral; gradual smooth boundary.

BC—61 to 76 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; friable; many very fine and fine tubular pores; neutral; gradual smooth boundary.

C—76 to 80 inches; dark yellowish brown (10YR 4/4) silty clay loam; massive; friable; many very fine and fine tubular pores; few fine irregular very dark brown (10YR 2/2) masses of manganese; few fine distinct (10YR 5/2) redoximorphic depletions; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches
Thickness of the mollic epipedon: 32 to 52 inches

Ap or A horizon:
Hue—10YR

Value—2
Chroma—1 or 2
Texture—silty clay loam
Reaction—moderately acid to neutral

AB horizon:
Hue—10YR
Value—2 or 3
Chroma—2
Texture—silty clay loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 or 4
Chroma—3 or 4
Texture—silty clay loam
Reaction—moderately acid to neutral

BC horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—slightly acid to slightly alkaline

C horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—slightly acid to slightly alkaline

Kennebec Series

Typical Pedon

Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain; in Crawford County, Iowa; 2,110 feet north and 62 feet east of the southwest corner of sec. 27, T. 82 N., R. 41 W.; USGS Dunlap NE topographic quadrangle; lat. 41 degrees 52 minutes 59.5 seconds N. and long. 95 degrees 36 minutes 54.3 seconds W., NAD 83:

Ap—0 to 8 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; friable; common fine and very fine roots; few fine and very fine tubular pores; slightly acid; clear smooth boundary.

A1—8 to 18 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; friable; common fine and very fine roots; common fine tubular pores; slightly acid; diffuse smooth boundary.

A2—18 to 32 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common fine and medium tubular pores; slightly acid; diffuse smooth boundary.

A3—32 to 41 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure; friable; few very fine roots; few fine and medium tubular pores; many large wormholes; slightly acid; diffuse smooth boundary.

AC—41 to 54 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; few very fine roots; few very fine tubular pores; slightly acid; diffuse smooth boundary.

C1—54 to 63 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; few fine tubular pores; few fine rounded very dark brown (7.5YR 2.5/2) iron and manganese concretions; common medium faint dark brown (10YR 3/3) and common fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; few fine faint grayish brown (10YR 5/2) redoximorphic depletions; slightly acid; diffuse smooth boundary.

C2—63 to 72 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; few fine tubular pores; common fine prominent dark yellowish brown (10YR 4/6) redoximorphic concentrations; slightly acid; diffuse smooth boundary.

C3—72 to 80 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; few fine tubular pores; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid.

Range in Characteristics

Depth to carbonates: More than 80 inches
Thickness of the mollic epipedon: More than 40 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3; 3 or 4 in the overwash phase
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

AC horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam
Reaction—slightly acid or neutral

C horizon:
Hue—10YR or 2.5Y
Value—2 to 4
Chroma—1 or 2
Texture—silt loam
Reaction—slightly acid or neutral

Knox Series

Typical Pedon

Knox silt loam, 14 to 20 percent slopes, in a timbered pasture in the uplands; in Crawford County, Iowa; 180 feet east and 150 feet north of the southwest corner of sec. 10, T. 82 N., R. 41 W.; USGS Dunlap NE topographic quadrangle; lat. 41 degrees 55 minutes 18.5 seconds N. and long. 95 degrees 36 minutes 49 seconds W., NAD 83:

A—0 to 7 inches; very dark brown (10YR 3/2) silt loam, brown (10YR 5/2) dry; moderate very fine and fine subangular blocky structure parting to moderate fine granular; friable; many fine and medium roots; many very fine and fine tubular pores; many distinct black (10YR 2/1) organic coats on faces of peds; slightly acid; clear smooth boundary.

E—7 to 13 inches; dark grayish brown (10YR 4/3) silt loam, grayish brown (10YR 5/3) dry; moderate very thin and thin platy structure; friable; many very fine and fine roots; many very fine and fine tubular pores; few distinct light brownish gray (10YR 6/2) silt coats on faces of plates; slightly acid; clear smooth boundary.

Bt1—13 to 19 inches; brown (10YR 4/3) silty clay loam; moderate and strong very fine and fine subangular blocky structure; friable; many very fine and fine roots; many very fine and fine tubular pores; common distinct dark brown (10YR 3/3) organic coats on faces of peds; very few distinct light brownish gray (10YR 6/2) (dry) silt coats on faces of peds; moderately acid; clear smooth boundary.

Bt2—19 to 29 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate and strong fine subangular blocky; friable; common very fine and fine roots; many very fine and fine tubular pores; common distinct brown (10YR 4/3) clay films on faces of peds; few distinct light brownish gray (10YR 6/2) (dry) silt coats on faces of peds; few distinct dark brown (10YR 3/3) organic coats on faces of peds; moderately acid; clear smooth boundary.

Bt3—29 to 40 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and coarse prismatic structure parting to moderate fine subangular blocky; friable; common very fine and fine roots; many very fine and fine tubular pores; common distinct brown (10YR 4/3) clay films on faces of peds and on surfaces along pores; few distinct light brownish gray (10YR 6/2) (dry) silt coats on faces of peds; moderately acid; gradual smooth boundary.

Bt4—40 to 60 inches; yellowish brown (10YR 5/4) silt loam; moderate medium and coarse prismatic structure parting to moderate fine subangular blocky; friable; common very fine and fine roots; many very fine and fine tubular pores; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct light brownish gray (10YR 6/2) (dry) silt coats on faces of peds; moderately acid; gradual smooth boundary.

Bt5—60 to 70 inches; yellowish brown (10YR 5/4) silt loam; moderate medium and coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; common very fine roots; many very fine and fine tubular pores; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct light brownish gray (10YR 6/2) (dry) silt coats on faces of peds; slightly acid; clear smooth boundary.

BC—70 to 80 inches; yellowish brown (10YR 5/4) silt loam; weak medium and coarse prismatic structure parting to weak fine and medium subangular blocky; friable; common very fine roots; many very fine and fine tubular pores; common distinct light brownish gray (10YR 6/2) (dry) silt coats on faces of peds; slightly acid.

Range in Characteristics

A or Ap horizon:

Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—silt loam
Reaction—moderately acid to neutral

E horizon:

Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—silt loam
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

BC horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture—silt loam
Reaction—moderately acid to neutral

Liston Series

Typical Pedon

Liston clay loam (fig. 13), in an area of Liston-Burchard complex, 14 to 18 percent slopes, moderately eroded, in a cultivated field in the uplands; in Crawford County, Iowa; about 9.5 miles northeast of Denison; 840 feet north and 1,410 feet west of the southeast corner of sec. 28, T. 85 N., R. 38 W.; USGS Kiron topographic quadrangle; lat. 42 degrees 08 minutes 29.4 seconds N. and long. 95 degrees 16 minutes 08.9 seconds W., NAD 83:

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; many very fine and fine roots; many very fine and fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw—5 to 12 inches; brown (10YR 4/3) clay loam; moderate fine subangular blocky structure; firm; many very fine roots; many very fine and fine tubular pores; common distinct dark brown (10YR 3/3) organic coats on vertical faces of peds; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—12 to 18 inches; yellowish brown (10YR 5/4) clay loam; moderate fine subangular blocky structure; firm; many very fine roots; common very fine and fine tubular pores; common fine and medium very pale brown (10YR 8/2) masses of carbonate; few fine and medium very pale brown (10YR 8/2) carbonate concretions; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—18 to 29 inches; yellowish brown (10YR 5/4) clay loam; moderate medium and coarse prismatic structure parting to moderate fine subangular blocky; firm; common very fine roots; common very fine and fine tubular pores; common medium coarse very pale brown (10YR 8/2) masses of carbonate; few fine and medium very pale brown (10YR 8/2) carbonate concretions; few fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk3—29 to 38 inches; yellowish brown (10YR 5/4) clay loam; moderate medium and coarse prismatic structure parting to moderate fine angular blocky; firm; common very fine roots; common very fine and fine tubular pores; common medium and coarse very pale brown (10YR 8/2) masses of carbonate; few fine and medium very pale brown (10YR 8/2) carbonate concretions; few fine distinct grayish brown (2.5Y 5/2) redoximorphic depletions; few fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

Figure 13.—Profile of Liston clay loam.

C1—38 to 55 inches; brown (10YR 5/3) clay loam; massive; firm; common very fine roots; common very fine and fine tubular pores; common fine and medium very pale brown (10YR 8/2) masses of carbonate; common fine and medium very pale brown (10YR 8/2) carbonate concretions; common fine and medium prominent strong brown (7.5YR 4/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—55 to 67 inches; about 50 percent strong brown (7.5YR 5/6) and 50 percent grayish brown (2.5Y 5/2) clay loam; massive; firm; common very fine and fine tubular pores; common fine and medium very pale brown (10YR 8/2) masses of carbonate; few fine and medium very pale brown (10YR 8/2) carbonate concretions; few distinct very dark brown (7.5YR 2/2) manganese stains on faces of peds and in pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—67 to 80 inches; about 50 percent strong brown (7.5YR 5/6) and 50 percent gray (2.5Y 6/1) clay loam; massive; firm; common very fine and fine tubular pores;

common fine and medium very pale brown (10YR 8/2) masses of carbonate; few fine and medium very pale brown (10YR 8/2) carbonate concretions; few distinct very dark brown (7.5YR 2/2) manganese stains on faces of peds and in pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 0 to 10 inches

A or Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam or clay loam
Reaction—neutral to moderately alkaline

Bw horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 or 4
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

Bk horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—7.5YR, 10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 6
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

Marshall Series

Typical Pedon

Marshall silty clay loam (fig. 14), 2 to 5 percent slopes, in a cultivated field on a ridgetop; in Crawford County, Iowa; 2,000 feet south and 310 feet west of the northeast corner of sec. 12, T. 83 N., R. 37 W.; USGS Arcadia topographic quadrangle; lat. 42 degrees 01 minute 03 seconds N. and long. 95 degrees 05 minutes 36 seconds W., NAD 27:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) and very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine and medium subangular blocky structure parting to weak fine granular; friable; many very fine to medium roots; many very fine tubular pores; moderately acid; abrupt smooth boundary.

A1—7 to 14 inches; very dark grayish brown (10YR 3/2) and very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; many very fine to medium roots; many very fine tubular pores; common distinct very dark brown (10YR 2/2) organic coats on vertical faces of peds and in pores; moderately acid; clear smooth boundary.

Figure 14.—Profile of Marshall silty clay loam.

A2—14 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; many very fine to medium roots; many very fine and fine tubular pores; many distinct very dark brown (10YR 2/2) organic coats on faces of peds and in pores; slightly acid; clear smooth boundary.

Bw1—22 to 36 inches; brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common very fine and fine roots; many very fine and fine tubular pores; few distinct dark brown (10YR 3/3) organic coats on faces of peds and in pores; slightly acid; clear smooth boundary.

Bw2—36 to 41 inches; brown (10YR 5/3) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common very fine and fine roots; many very fine and fine tubular pores; few fine and medium faint grayish brown (10YR 5/2) redoximorphic depletions; common fine and medium distinct yellowish brown (10YR 5/6) and few fine faint brown (7.5YR 4/4) redoximorphic concentrations; slightly acid; clear smooth boundary.

Bw3—41 to 53 inches; brown (10YR 5/3) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; common very fine and fine roots; many very fine and fine tubular pores; few distinct dark grayish

brown (10YR 4/2) organic coats in root channels and pores; few fine irregular very dark brown (10YR 2/2) masses of manganese; common fine and medium faint grayish brown (10YR 5/2) redoximorphic depletions; common fine and medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

BC—53 to 62 inches; brown (10YR 5/3) silty clay loam; weak coarse prismatic structure; friable; few very fine roots; many very fine and fine tubular pores; common fine and medium faint grayish brown (10YR 5/2) redoximorphic depletions; common fine and medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; neutral; gradual smooth boundary.

C1—62 to 68 inches; mottled brown (10YR 5/3), grayish brown (2.5Y 5/2), and dark yellowish brown (10YR 4/6) silty clay loam; massive; friable; few very fine roots; many very fine and fine tubular pores; neutral; gradual smooth boundary.

C2—68 to 74 inches; brown (10YR 5/3) silty clay loam; massive; friable; few very fine roots; many very fine and fine tubular pores; few fine irregular very dark brown (10YR 2/2) masses of manganese; many fine and medium faint grayish brown (2.5Y 5/2) redoximorphic depletions; many fine and medium distinct dark yellowish brown (10YR 4/6) and common fine and medium distinct reddish brown (5YR 4/4) redoximorphic concentrations; neutral; gradual smooth boundary.

Cg—74 to 80 inches; grayish brown (2.5Y 5/2) silty clay loam; massive; friable; many very fine and fine tubular pores; many fine and medium prominent dark yellowish brown (10YR 4/6) and common fine and medium faint brown (10YR 5/3) redoximorphic concentrations; neutral.

Range in Characteristics

Depth to carbonates: More than 72 inches
Thickness of the mollic epipedon: 10 to 24 inches
Note: Grayish brown, yellowish brown, strong brown, and brown redoximorphic features are in the lower part of the B horizon and in the C horizon. These features are considered relict.

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2; 2 in pedons where value is 3
Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 or 4 (upper part); 4 or 5 (lower part)
Chroma—3 (upper part); 3 or 4 (lower part)
Texture—silty clay loam
Reaction—moderately acid or slightly acid

BC and C horizons:
Hue—10YR to 5Y
Value—4 or 5
Chroma—2 to 6
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

Taxadjunct features: The moderately eroded and severely eroded Marshall soils in Crawford County are taxadjuncts because the surface layer does not meet the thickness requirements for a Mollisol.

Minden Series

Typical Pedon

Minden silty clay loam, 0 to 2 percent slopes, in a cultivated field on a slightly convex slope; in Cass County, Iowa; 380 feet north and 1,560 feet west of the southeast corner of sec. 31, T. 75 N., R. 37 W.; USGS Griswold topographic quadrangle; lat. 41 degrees 14 minutes 45.9 seconds N. and long. 95 degrees 08 minutes 32.2 seconds W., NAD 83:

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine granular structure; friable; many very fine roots throughout; many very fine tubular pores; moderately acid; clear smooth boundary.

A1—7 to 15 inches; black (10YR 2/1) silty clay loam, gray (10YR 4/1) dry; weak fine granular structure; friable; many very fine roots throughout; many very fine tubular pores; moderately acid; gradual smooth boundary.

A2—15 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to weak medium granular; friable; common very fine roots throughout; common very fine tubular pores; moderately acid; gradual smooth boundary.

Bw1—22 to 32 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; friable; common very fine roots throughout; common very fine tubular pores; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Bw2—32 to 40 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine and medium subangular blocky structure; friable; few very fine roots throughout; common very fine tubular pores; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Bw3—40 to 48 inches; grayish brown (2.5Y 5/2) silty clay loam; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots throughout; common very fine tubular pores; many coarse distinct yellowish brown (10YR 5/4) and many coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Bw4—48 to 58 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium subangular blocky structure; friable; common coarse distinct yellowish brown (10YR 5/4) and many coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

BC—58 to 66 inches; grayish brown (2.5Y 5/2) silty clay loam; weak coarse subangular blocky structure; friable; common coarse distinct yellowish brown (10YR 5/4) and common coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

C—66 to 80 inches; grayish brown (2.5Y 5/2) silt loam; massive; friable; common coarse distinct yellowish brown (10YR 5/4) and common coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: 16 to 24 inches
Depth to carbonates: More than 72 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silty clay loam
Reaction—moderately acid to neutral

BC horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—2 to 6
Texture—silty clay loam
Reaction—moderately acid to neutral

C horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—2 to 6
Texture—silt loam
Reaction—moderately acid to neutral

Monona Series

Typical Pedon

Monona silt loam, 2 to 5 percent slopes, in a cultivated field on a ridgetop; in Crawford County, Iowa; 480 feet east and 180 feet north of the southwest corner of sec. 35, T. 84 N., R. 41 W.; USGS Charter Oak topographic quadrangle; lat. 42 degrees 02 minutes 15.6 seconds N. and long. 95 degrees 35 minutes 35 seconds W., NAD 83:

Ap—0 to 8 inches; very dark brown (10YR 2/2) silt loam, very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure parting to moderate fine granular; friable; common very fine roots; common very fine and fine tubular pores; neutral; abrupt smooth boundary.

A—8 to 16 inches; very dark brown (10YR 2/2) silt loam; some mixing of dark brown (10YR 3/3) in the lower part; dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; few very fine roots; many very fine and fine tubular pores; few distinct very dark grayish brown (10YR 3/2) organic coats on faces of peds; moderately acid; clear smooth boundary.

Bw1—16 to 23 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable; few very fine roots; many very fine and fine tubular pores; slightly acid; clear smooth boundary.

Bw2—23 to 30 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; few very fine roots; many very fine and fine tubular pores; few distinct very dark grayish brown (10YR 3/2) organic coats on vertical faces of peds; slightly acid; gradual smooth boundary.

Bw3—30 to 45 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; few very fine roots; many very fine and fine tubular pores; neutral; gradual smooth boundary.

Bw4—45 to 52 inches; yellowish brown (10YR 5/4) silt loam; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few very fine roots; common very fine and fine tubular pores; few fine prominent irregular dark reddish brown (5YR 2/2) masses of manganese; neutral; gradual smooth boundary.

C—52 to 80 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few very fine roots; common very fine and fine tubular pores; few fine prominent irregular dark reddish brown (5YR 2/2) masses of manganese; few fine and medium distinct

grayish brown (2.5Y 5/2) redoximorphic depletions; common fine and medium distinct dark yellowish brown (10YR 4/6) and few fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Depth to relict redoximorphic features: 22 to 65 inches
Thickness of the mollic epipedon: 10 to 24 inches
Note: The redoximorphic features described in the lower part of the Bw horizon and in the C horizon are considered relict.

Ap or A horizon:
Hue—10YR
Value—2
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral

AB horizon (if it occurs):
Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

Bw horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

C horizon:
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—silt loam
Reaction—neutral to moderately alkaline

Taxadjunct features: The moderately eroded and severely eroded Monona soils in Crawford County are taxadjuncts because the surface layer does not meet the thickness requirements for a Mollisol.

Napier Series

Typical Pedon

Napier silt loam, 2 to 5 percent slopes, in a cultivated field in an upland drainageway; in Crawford County, Iowa; 280 feet south and 850 feet east of the northwest corner of sec. 30, T. 85 N., R. 41 W.; USGS Danbury topographic quadrangle; lat. 42 degrees 03 minutes 56.9 seconds N. and long. 95 degrees 40 minutes 05.1 seconds W., NAD 83:

Ap—0 to 9 inches; very dark brown (10YR 2/2) silt loam, very dark gray (10YR 3/1) dry; weak fine and medium subangular blocky structure parting to weak fine granular; friable; common very fine and fine roots; few fine tubular pores; many distinct black (10YR 2/1) organic coats on faces of peds; slightly acid; abrupt smooth boundary.

A1—9 to 17 inches; very dark brown (10YR 2/2) silt loam, very dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; common very fine roots; common fine tubular pores; slightly acid; gradual smooth boundary.

A2—17 to 26 inches; very dark brown (10YR 2/2) silt loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; friable; common very fine roots; common fine tubular pores; slightly acid; gradual smooth boundary.

BA—26 to 36 inches; very dark grayish brown (10YR 3/3) silt loam, dark grayish brown (10YR 4/3) dry; weak fine subangular blocky structure; friable; few very fine roots; common fine tubular pores; many distinct dark brown (10YR 3/2) organic coats on faces of peds and on surfaces along pores; slightly acid; gradual smooth boundary.

Bw1—36 to 47 inches; brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; few very fine roots; common fine tubular pores; common distinct very dark grayish brown (10YR 3/2) organic coats on faces of peds and on surfaces along pores; slightly acid; gradual smooth boundary.

Bw2—47 to 61 inches; brown (10YR 4/3) silt loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable; common fine tubular pores; very few distinct light brownish gray (10YR 6/2) silt coats on faces of peds; slightly acid; gradual smooth boundary.

Bw3—61 to 71 inches; brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; common fine tubular pores; slightly acid; clear smooth boundary.

C—71 to 80 inches; brown (10YR 4/3) silt loam; massive; friable; neutral.

Range in Characteristics

Depth to carbonates: More than 36 inches
Thickness of the mollic epipedon: 24 to 40 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam
Reaction—slightly acid or neutral

BA horizon:
Hue—10YR
Value—3
Chroma—3
Texture—silt loam
Reaction—slightly acid to moderately alkaline

Bw horizon:
Hue—10YR
Value—4
Chroma—3 or 4
Texture—silt loam
Reaction—slightly acid to moderately alkaline

C horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silt loam
Reaction—slightly acid to moderately alkaline

Nodaway Series

Typical Pedon

Nodaway silt loam (fig. 15), 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain; in Fremont County, Iowa; about 3 miles east of Sidney; about 2,530 feet north and 265 feet west of the southeast corner of sec. 30, T. 69 N., R. 41 W.; USGS Randolph quadrangle; lat. 40 degrees 51 minutes 11 seconds N. and long. 95 degrees 40 minutes 15 seconds W., NAD 83:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many roots; neutral; clear smooth boundary.

C1—7 to 31 inches; stratified, dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), and very dark grayish brown (10YR 3/2) silt loam; massive with weak thin alluvial stratification; friable; neutral; clear wavy boundary.

C2—31 to 42 inches; stratified, very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) silty clay loam; massive with weak thin alluvial stratification; friable; few very thin strata of silt loam; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; neutral; gradual wavy boundary.

C3—42 to 80 inches; stratified, dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), and very dark grayish brown (10YR 3/2) silt loam; massive with weak thin alluvial stratification; friable; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Depth to buried horizons: More than 40 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

C horizon:
Hue—10YR
Value—2 to 5
Chroma—1 or 2
Texture—silt loam or silty clay loam or stratified with these textures
Reaction—slightly acid or neutral

Ab horizon (if it occurs):
Hue—10YR or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

Bb horizon (if it occurs):
Hue—10YR
Value—3
Chroma—2
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

Figure 15.—Profile of Nodaway silt loam.

Rawles Series

Typical Pedon

Rawles silt loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain; in Crawford County, Iowa; 400 feet south and 1,460 feet east of the northwest corner of sec. 31, T. 83 N., R. 41 W.; USGS Dunlap NW topographic quadrangle; lat. 41 degrees 57 minutes 49.5 seconds N. and long. 95 degrees 39 minutes 58.8 seconds W., NAD 83:

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; friable; common very fine and fine roots; common very fine tubular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1—8 to 25 inches; stratified, dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) silt loam; massive but parting along horizontal layers of deposition; friable; few very fine and fine roots; common very fine and fine tubular pores; slightly effervescent; moderately alkaline; clear smooth boundary.

C2—25 to 33 inches; very dark grayish brown (10YR 3/2) silt loam; massive but parting along horizontal layers of deposition; friable; few very fine and fine roots; common very fine and fine tubular pores; common fine distinct yellowish brown (10YR 5/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

Ab1—33 to 52 inches; very dark brown (10YR 2/2) silty clay loam; weak fine subangular blocky structure; friable; many very fine and fine tubular pores; many distinct black (10YR 2/1) organic coats on faces of peds; slightly effervescent; slightly alkaline; gradual smooth boundary.

Ab2—52 to 64 inches; very dark brown (10YR 2/2) silty clay loam; moderate fine subangular blocky structure; friable; many very fine and fine tubular pores; many distinct black (10YR 2/1) organic coats on faces of peds; slightly effervescent; slightly alkaline; gradual smooth boundary.

Ab3—64 to 74 inches; very dark brown (10YR 2/2) silty clay loam; moderate fine subangular blocky structure; friable; many very fine and fine tubular pores; many distinct black (10YR 2/1) organic coats on faces of peds; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; very slightly effervescent; slightly alkaline; clear smooth boundary.

Ab4—74 to 80 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine subangular blocky structure; friable; many very fine and fine tubular pores; many distinct black (10YR 2/1) organic coats on faces of peds; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; very slightly effervescent; slightly alkaline.

Range in Characteristics

Depth to buried soil: 20 to 40 inches
Depth to carbonates: 0 to 10 inches

Ap or A horizon:
Hue—10YR
Value—3
Chroma—2 or 3
Texture—silt loam
Reaction—neutral to moderately alkaline

C horizon:
Hue—10YR
Value—3 to 5
Chroma—2 or 3
Texture—silt loam
Reaction—slightly alkaline or moderately alkaline

Ab horizon:
Hue—10YR
Value—2 to 4
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—slightly acid to slightly alkaline

Shelby Series

Typical Pedon

Shelby clay loam, 9 to 14 percent slopes, in a cultivated field; in Adair County, Iowa; about 6 miles north of Greenfield; about 1,617 feet east and 2,109 feet south of the northwest corner of sec. 18, T. 76 N., R. 31 W.; USGS Rosserdale topographic quadrangle; lat. 41 degrees 22 minutes 57 seconds N. and long. 94 degrees 27 minutes 58 seconds W., NAD 83:

Ap—0 to 7 inches; very dark brown (10YR 2/2) and black (10YR 2/1) clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; moderately acid; clear smooth boundary.

AB—7 to 11 inches; very dark grayish brown (10YR 3/2), very dark brown (10YR 2/2), and dark brown (10YR 3/3) clay loam, very dark brown (10YR 2/2) dry; moderate fine subangular blocky structure; friable; strongly acid; clear smooth boundary.

Bt1—11 to 17 inches; dark brown (10YR 3/3) clay loam; moderate fine subangular blocky structure; firm; many distinct continuous clay films on faces of peds; about 3 percent gravel; strongly acid; clear smooth boundary.

Bt2—17 to 23 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; firm; many distinct clay films on faces of peds; moderately acid; clear smooth boundary.

Bt3—23 to 34 inches; brown (10YR 4/3) clay loam; weak fine and medium subangular blocky structure; firm; many distinct continuous clay films on faces of peds; few fine faint grayish brown (2.5Y 5/2) redoximorphic depletions; few coarse prominent strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/8) redoximorphic concentrations; about 3 percent gravel; moderately acid; gradual smooth boundary.

Bt4—34 to 48 inches; brown (10YR 4/3) clay loam; weak medium and coarse subangular blocky structure; firm; common distinct clay films on faces of peds; common medium distinct grayish brown (2.5Y 5/2) redoximorphic depletions; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; about 3 percent gravel; slightly acid; clear smooth boundary.

Btk—48 to 60 inches; mottled grayish brown (2.5Y 5/2) and dark yellowish brown (10YR 4/4) clay loam; weak coarse prismatic structure; firm; common distinct clay films on vertical faces of peds; common white soft to very hard carbonate nodules less than 1/4 inch in diameter; about 3 percent gravel; strongly effervescent; moderately alkaline; gradual smooth boundary.

C—60 to 72 inches; mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) clay loam; massive; friable; about 3 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics:

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: More than 30 inches
Note: The redoximorphic features described in this pedon are believed to be relict and were not considered as indicators of current wetness conditions. These features were not considered in the classification of these soils.

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam, clay loam, or silt loam
Reaction—strongly acid to neutral

AB horizon:
Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—loam, clay loam, or silt loam
Reaction—strongly acid to neutral

Bt horizon:
Hue—10YR
Value—3 to 5
Chroma—3 to 6
Texture—clay loam
Reaction—strongly acid to neutral

Bk or Btk horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

BC or C horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—clay loam, loam, or sandy clay loam
Reaction—neutral to moderately alkaline

Smithland Series

Typical Pedon

Smithland silty clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain; in Crawford County, Iowa; about 1,680 feet west and 1 foot south of the northeast corner of sec. 34, T. 82 N., R. 41 W.; USGS Dunlap NE topographic quadrangle; lat. 41 degrees 51 minutes 59.6 seconds N. and long. 95 degrees 36 minutes 19.4 seconds W., NAD 83:

Ap—0 to 5 inches; black (10YR 2/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak very fine and fine subangular blocky structure; friable; many fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

A1—5 to 11 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak very fine and fine subangular blocky structure; friable; many fine roots; many very fine tubular pores; neutral; gradual smooth boundary.

A2—11 to 30 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; friable; common fine roots; many very fine tubular pores; neutral; gradual smooth boundary.

A3—30 to 39 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; friable; few very fine roots; common very fine tubular pores; neutral; gradual smooth boundary.

Bg1—39 to 46 inches; very dark gray (10YR 3/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak very fine prismatic structure parting to weak fine subangular blocky; friable; few very fine roots; common very fine tubular pores; common distinct black (10YR 2/1) organic coats on faces of peds; common fine faint very dark grayish brown (2.5Y 3/2) redoximorphic concentrations; neutral; gradual smooth boundary.

Bg2—46 to 56 inches; very dark gray (10YR 3/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak medium prismatic structure parting to weak medium subangular blocky; friable; few very fine tubular pores; common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; neutral; gradual smooth boundary.

Bg3—56 to 66 inches; very dark gray (10YR 3/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak medium prismatic structure parting to weak medium subangular blocky; friable; few very fine tubular pores; many fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; neutral; gradual smooth boundary.

BCg—66 to 80 inches; very dark gray (10YR 3/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak medium prismatic structure; friable; few very fine tubular pores; many fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; slightly acid.

Range in Characteristics

Depth to carbonates: 60 inches or more
Thickness of the mollic epipedon: 36 inches or more
Other features: Some pedons have silt loam overwash as much as 10 inches thick.

Ap or A horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam or silt loam
Reaction—moderately acid to neutral

Bg horizon:
Hue—10YR
Value—2 to 4
Chroma—1 or 2
Texture—silty clay loam
Reaction—moderately acid to neutral

BCg horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 or 2
Texture—silty clay loam
Reaction—moderately acid to neutral

Cg horizon (if it occurs):
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 or 2
Texture—silty clay loam
Reaction—slightly acid or neutral

Strahan Series

Typical Pedon

Strahan silt loam, 9 to 14 percent slopes, moderately eroded, in a cultivated field on a convex slope; in Mills County, Iowa; about 7 miles southeast of Malvern; 522 feet east and 1,528 feet south of the northwest corner of sec. 18, T. 71 N., R. 42 W.

Ap—0 to 7 inches; mixed brown (10YR 4/3) and very dark grayish brown (10YR 3/2) silt loam, pale brown (10YR 6/3) and dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; neutral; clear smooth boundary.

C1—7 to 18 inches; mottled brown (10YR 4/3), grayish brown (10YR 5/2), and yellowish brown (10YR 5/6) silt loam; massive; very friable; neutral; gradual smooth boundary.

C2—18 to 39 inches; grayish brown (10YR 5/2) silt loam; common medium and coarse faint yellowish brown (10YR 5/6 to 5/8) mottles; massive; very friable; neutral; gradual smooth boundary.

C3—39 to 60 inches; mottled grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) silt loam; massive; very friable; few nodules high in iron (pipestems), few dark stains, and few soft calcium carbonate accumulations; slight effervescence; slightly alkaline.

Range in Characteristics

Depth to carbonates: 30 to 60 inches; typically decreasing with increasing gradient on convex slopes

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—silt loam
Reaction—neutral

C horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—2 to 8
Texute—silt loam
Reaction—neutral or slightly alkaline in the upper part; slightly alkaline or moderately alkaline in the lower part

Zook Series

Typical Pedon

Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field on a flood plain; in Crawford County, Iowa; 820 feet north and 1,450 feet east of the southwest corner of sec. 12, T. 84 N., R. 41 W.; USGS Charter Oak topographic quadrangle; lat. 42 degrees 05 minutes 51.3 seconds N. and long. 95 degrees 34 minutes 06.9 seconds W., NAD 83:

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine and medium subangular blocky structure parting to weak fine granular; friable; common very fine and fine roots; common very fine tubular pores; moderately acid; abrupt smooth boundary.

A1—6 to 14 inches; black (N 2/0) silty clay loam, black (10YR 2/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; common very fine and fine roots; many very fine and fine tubular pores; slightly acid; clear smooth boundary.

A2—14 to 21 inches; black (N 2/0) silty clay loam, black (10YR 2/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; common very fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.

A3—21 to 36 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; common very fine roots; many very fine and fine tubular pores; neutral; clear smooth boundary.

BA—36 to 48 inches; very dark gray (10YR 3/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; many distinct black (10YR 2/1) organic coatings on faces of peds; common very fine roots; many very fine and fine tubular pores; common fine prominent brown (7.5YR 4/4) redoximorphic concentrations; neutral; gradual smooth boundary.

Bg1—48 to 56 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine roots; many very fine and fine tubular pores; common fine prominent brown (7.5YR 4/4) redoximorphic concentrations; neutral; gradual smooth boundary.

Bg2—56 to 64 inches; very dark gray (2.5Y 3/1) silty clay loam; moderate medium and coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; common very fine roots; many very fine and fine tubular pores; common fine prominent brown (7.5YR 4/4) redoximorphic concentrations; neutral; gradual smooth boundary.

Bg3—64 to 73 inches; very dark gray (2.5Y 3/1) silty clay loam; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; many very fine and fine tubular pores; common fine prominent brown (7.5YR 4/4) redoximorphic concentrations; neutral; clear smooth boundary.

Bg4—73 to 80 inches; dark gray (5Y 4/1) silty clay loam; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; many very fine and fine tubular pores; common fine prominent brown (7.5YR 4/4) redoximorphic concentrations; neutral.

Range in Characteristics

Thickness of the mollic epipedon: More than 36 inches
Depth to redoximorphic concentrations: 24 to 60 inches
Depth to carbonates: 60 to more than 80 inches

Ap or A horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—moderately acid to slightly alkaline

Bg horizon or Cg horizon (if it occurs):
Hue—10YR, 2.5Y, or 5Y
Value—2 to 5
Chroma—1
Texture—silty clay loam or silty clay
Reaction—slightly acid or neutral

Formation of the Soils

This section relates the soils in the survey area to the major factors of soil formation.

Factors of Soil Formation

Soils form through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by five major soil-forming factors—the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material (Jenny, 1941). Human activities also affect soil formation.

Climate and plant and animal life, chiefly plants, are the active factors of soil formation. They act on parent material that has accumulated through weathering of rocks and slowly change it into a natural body that has genetically related horizons. Relief conditions the effects of climate and plant and animal life. The parent material also affects the kind of profile that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the changing of parent material into a soil. The length of time can vary, but some time is required for differentiation of soil horizons. A long period of time is generally required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the others.

Parent Material

The accumulation of parent material is the first step in the formation of soil. Most soils formed in material that was transported from the site of the parent material and redeposited at a new location through the action of glacial ice, water, wind, or gravity. The principal kinds of parent material in Crawford County are glacial drift, loess, alluvium, and eolian sands.

Glacial drift is rock material transported and deposited by glacial ice, including the material sorted and unsorted by meltwater. It includes glacial till, glacial sediments, and glacial outwash. Till consists of unsorted deposits in which particles range in size from boulders to clay. The glacial material exposed in Crawford County is made up predominantly of till. The survey area underwent at least two major episodes of glaciation. They are often referred to as Pleistocene glacial stages, previously called the Nebraskan and Kansan but now referred to collectively as the Pre-Illinoian. These deposits are considered to be more than 300,000 years in age. The Pre-Illinoian till in Crawford County is mostly buried by loess, or wind-deposited material, but in some of the steeper eroded areas, especially along major rivers and streams, the till has been exposed on the shoulders and on the lower part of the slopes. Burchard and Liston soils formed in Pre-Illinoian glacial till.

Loess is silty material deposited by the wind. It consists mainly of silt- and clay-sized particles and small amounts (generally less than 15 percent) of fine or very fine sand. The loess in Crawford County typically ranges from 5 to 30 feet in thickness, but in some areas it is as much as 80 feet thick. The loess typically overlies Pre-Illinoian glacial drift and is commonly referred to as Wisconsin-age loess, ranging in age from about 12,500 to 31,000 years (Prior, 1991). Loess also typically caps the high stream terraces, which are commonly underlain by water-deposited sand and/or gravel. The loess was transported to the area following extensive erosion of the glacial surface, which filled river valleys with massive amounts of sediment. Although some of the loess is from local sources near to the area, most of the material originated in the Missouri River and Big Sioux River valleys. The loess was deposited by the prevailing northwest-to-southeast winds, which created a similar landscape pattern across western and southwestern Iowa.

Alluvium is sediment deposited by water on the flood plains along rivers and streams, on stream terraces, and in upland drainageways. The texture of alluvium varies widely because of differences in the material from which it was derived and the manner in which it was deposited. Alluvium that is adjacent to the present stream channel is typically silty and commonly contains thin strata of coarser sandy material from recent flooding. Nodaway soils formed in such stratified silty deposits. The content of clay in alluvium typically increases as the distance from the stream channel increases, particularly in the larger watershed areas. Kennebec silt loam and Kennebec silty clay loam formed away from the present stream channel, and Colo, Smithland, and Zook silty clay loams, which are much higher in clay content than the Nodaway or Kennebec soils, formed closest to the base of the upland slopes or high stream terraces. Alluvium that has been transported only a short distance is referred to as local alluvium because it retains many of the characteristics of the soils from which it was transported. Local alluvium transported and deposited by the forces of gravity, typically at the base or footslopes of much steeper slopes, is often referred to as colluvium. Judson and Napier soils formed in local alluvium and/or colluvium and are commonly downslope from the silty loess soils.

Eolian soils formed in sandy textured material deposited by the wind. The source of the sands is local in origin, primarily the result of the erosion of the glacial drift, and the deposits are in the uplands or along high stream terraces, commonly along the east side of the major rivers and streams. Chute soils formed in eolian sands.

Figure 16 provides a cross sectional view of the relationship between soils and parent material in the eastern part of Crawford County. Figure 17 provides a cross sectional view of this relationship in the western part of the county.

Climate

The soils of Crawford County formed under a variety of climatic conditions. They began to form following the deposition of loess about 12,500 years ago, when the climate began to warm and become less humid. Although this part of Iowa was not glaciated during the Cary Glacial Period, the return to much colder conditions to the north and east certainly had an effect on the type of vegetative growth and in slowing down the formation processes. During the post-Cary glaciation period 13,800 to 10,500 years ago, the climate was cool and the vegetation was dominantly conifers (Walker, 1966). During the period beginning about 10,500 years ago and ending about 8,000 years ago, a warming trend changed the vegetation from conifers to mixed hardwoods. Beginning about 8,000 years ago, the climate became warmer and drier and herbaceous prairie vegetation became dominant. A change from a dry to a moister climate began about 3,000 years ago (McComb and Loomis, 1944). The present climate is referred to as subhumid and midcontinental.

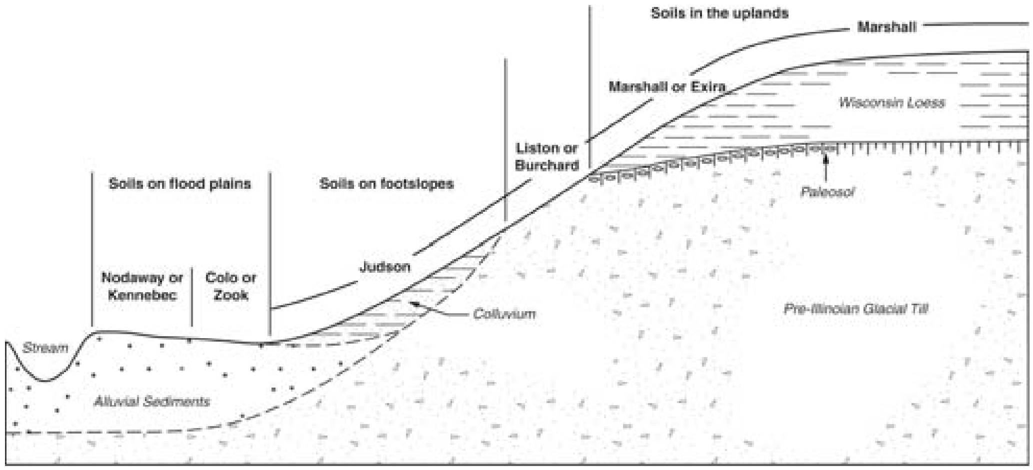

Figure 16.—A cross section showing the relationship between soils and parent material in the eastern part of Crawford County.

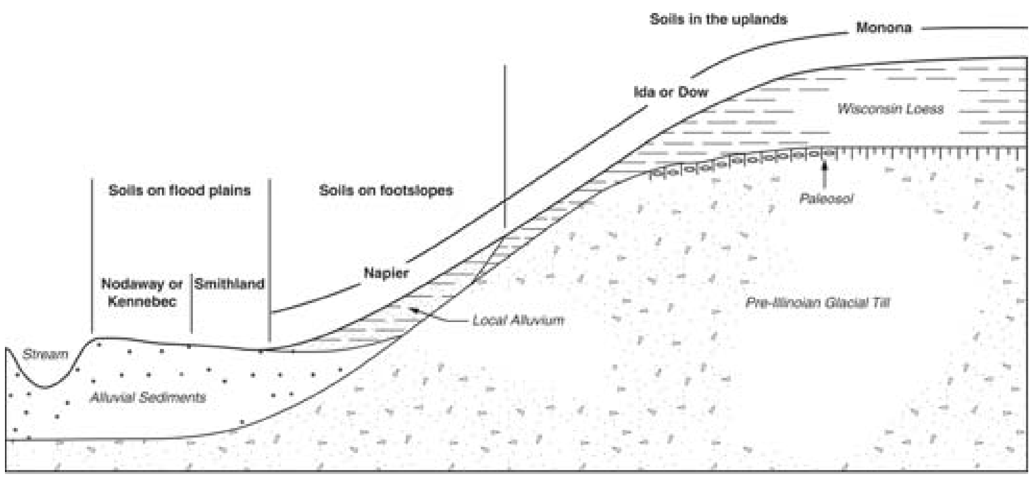

Figure 17.—A cross section showing the relationship between soils and parent material in the western part of Crawford County.

A nearly uniform climate prevails throughout the survey area. The general climate has had an important overall influence on the characteristics of the soils but has not created major differences among them. The influence of the general climate of the region, however, is modified by local conditions. For example, soils on south-facing slopes formed under a microclimate that is warmer and less humid than the average climate in nearby areas. The climate under which poorly drained soils in low areas, such as bottom lands, have been forming is typically wetter and colder than in most of the surrounding areas.

Changes in temperature activate the weathering of parent material by water and air. As the parent material weathers, changes caused by physical and chemical actions take place. Rainfall affects the amount of leaching in the soil and the kinds of plants that grow on the soil. Climate indirectly affects soil formation through the effects of temperature and other climatic factors on the plant and animal life on and in the soil. Crawford County is on the border of the more humid conditions of central and eastern Iowa and the less humid conditions of western Iowa and the bordering State of

Nebraska. The less humid conditions have had an influence on the soil properties of the calcareous soils of the Ida and Liston series. These soils have a high content of calcium carbonate because of the influence of the climatic effects on the weathering processes.

Living Organisms

All living organisms, including vegetation, animals, bacteria, and fungi, are important factors of soil formation. Plants are especially significant (McComb and others, 1961). Soil formation really begins with the growth of vegetation. Native grasses typically have an abundance of above-ground growth as well as a myriad of fibrous roots that penetrate the soil to an average depth of 10 to 20 inches. As these plants grow, and particularly when they die, they add large amounts of organic matter to the surface layer and contribute various nutrients to the surface layer and subsoil. Trees commonly feed on plant nutrients deep in the subsoil and contribute little organic material to the surface layer, other than that added by fallen leaves, twigs, and branches. Much of the organic material from dead trees actually remains on the soil surface.

Most of the soils of Crawford County formed under prairie grasses or under a mixture of prairie grasses and water-tolerant plants. A few soils formed under a mixture of hardwood trees and prairie grasses. Marshall and Monona soils are examples of soils that formed under prairie grasses. In their uneroded condition, these soils typically have a dark surface layer that is 10 to 20 inches thick and that contains 3 to 4 percent organic matter. Colo and Zook soils are examples of soils that formed under prairie grasses and water-tolerant plants. These soils have a thicker, darker topsoil and more organic matter than soils that formed strictly under a cover of prairie grasses. Knox and Liston soils are examples of soils that formed under a mixture of scattered hardwood trees and prairie grasses. These soils typically have a moderately dark surface layer that is 7 to 10 inches thick and that contains 1 to 3 percent organic matter.

The vegetation chiefly determines the color of the surface layer, the content of organic matter, and the nutrients in the soil, and the plant roots create soil pores and root channels. Earthworms and other burrowing animals also create soil pores and keep the soil porous. Bacteria and fungi help to decompose the vegetation and thereby release plant nutrients.

Important changes take place in the soil after it is artificially drained and cultivated for agriculture or altered for such activities as the construction of homes or commercial buildings. Some of these changes have little effect on the soil formation processes, but others have dramatic effects.

Changes by erosion generally are the most significant. Some of the cultivated or excavated soils in the county, particularly the steeper ones, have lost much of the original surface layer through sheet erosion. This loss of organic matter and of the finer structure that is typical in the upper part of the soil profile can reduce vegetative cover and increase runoff. Severe erosion can also expose calcium carbonates, which can cause nutrient deficiencies in plants and reduce crop yields.

Artificial drainage of soils, particularly in areas on bottom land, can improve conditions for cultivated crop growth but has also lowered the water table, increased soil temperatures, and changed chemical reactions in these normally cooler, wetter soils.

Human activities, such as soil excavation, tree removal, and building construction, can also alter the natural soil formation processes through soil compaction and the subsequent decrease in percolation rates.

Management practices have increased the productivity of some soils and have reclaimed areas that otherwise were not suitable for crop production or building sites.

Crops can be grown, for example, in many areas where subsurface drainage has sufficiently lowered the water table. Applications of commercial fertilizers have helped to overcome the deficiencies in plant nutrients and organic matter and thus have increased the productivity of many soils, particularly in moderately and severely eroded areas. A knowledge of the soils and the history of human activity in specific areas helps to determine whether natural soil conditions occur in that area.

Relief

Relief indirectly influences soil formation through its effect on soil drainage, runoff, and erosion. More water runs off the steeper slopes, and less percolates into the soil. The higher the runoff rate, the less leaching of carbonates and the less movement of clay from the surface horizons into the subsoil. The susceptibility to erosion increases as slope increases. Much of Crawford County is moderately sloping to very steep, and many areas are thus moderately or severely eroded.

Slope aspect affects soil formation. For example, south-facing slopes generally are warmer and drier than north-facing slopes. As a result, they typically support a different kind of vegetation.

The strongly sloping to very steep Monona soils, the gently sloping to strongly sloping Ida soils, and the nearly level to very gently sloping Monona soils on terraces, all of which formed in the same kind of parent material and under similar types of vegetation, differ because of differences in topographic position (fig. 18). The thickness and color of the A horizon and the thickness of the solum in these soils are affected by slope. The A horizon and the solum are thicker in the less sloping soils, and the A horizon is darker.

The micro-relief of the nearly level Colo, Kennebec, Nodaway, and Zook soils on bottom land affects runoff, depth to the water table, and the rate at which new sediments are deposited by flooding. Colo and Zook soils are in low positions on the

Figure 18.—A typical landscape in the Monona-Napier-Ida association. Monona and Ida soils are in the gently sloping to steep areas in the background; Napier soils are in the foreground.

landscape, generally some distance from the stream channel. They are poorly drained and may be ponded for short periods. Kennebec and Nodaway soils are typically slightly higher on the landscape, are generally closer to the stream channel, and are better drained than the Colo and Zook soils.

Time

The passage of time enables relief, climate, and plant and animal life to bring about changes in the parent material. If these factors are active for long periods, very similar kinds of soil can form in widely different kinds of parent materials. Soil formation is generally interrupted, however, by geologic events that expose new parent materials. In Crawford County, new parent material has been added to the entire landscape several times in the geologic past (Simonson and others, 1952). The limestone and sandstone bedrock that underlies all of Iowa was covered by Pre-Illinoian glacial drift at least twice and then by loess. New parent material is added to the upland drainageways and to the bottom lands with every passing erosional or flooding event, which typically creates the youngest soils in the county.

Geologically, the soils of Crawford County are young. The radiocarbon technique for determining the age of carbonaceous material found in organic deposits as well as in till has made it possible to determine the approximate age of the soil materials in Iowa. The dating process has indicated that the soils that formed in loess in MLRA 107 are at least 12,500 years old. In much of Iowa, including Crawford County, erosion has beveled and in places removed the loess material from side slopes and redeposited it as new sediment downslope. The surfaces of soils on nearly level to very gently sloping upland divides, such as the Marshall soils, are thus older than the eroded side slopes of the Exira soils (less than 12,500 years old). Both are older than the alluvial or colluvial sediments in upland drainageways. Further dating and research indicate that the alluvium deposited at the base of steep side slopes and on the bottom land along major rivers and streams is less than 3,000 years old. Napier and Judson soils on footslopes and Colo, Zook, and Nodaway soils on bottom land represent some of the younger soils in Crawford County.

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the “National Soil Survey Handbook” (available in local offices of the Natural Resources Conservation Service or on the Internet).

Ablation till. Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha,alpha-dipyridyl. A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction toward which a slope faces. Also called slope aspect.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope (fig. 19). In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal till. Compact till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

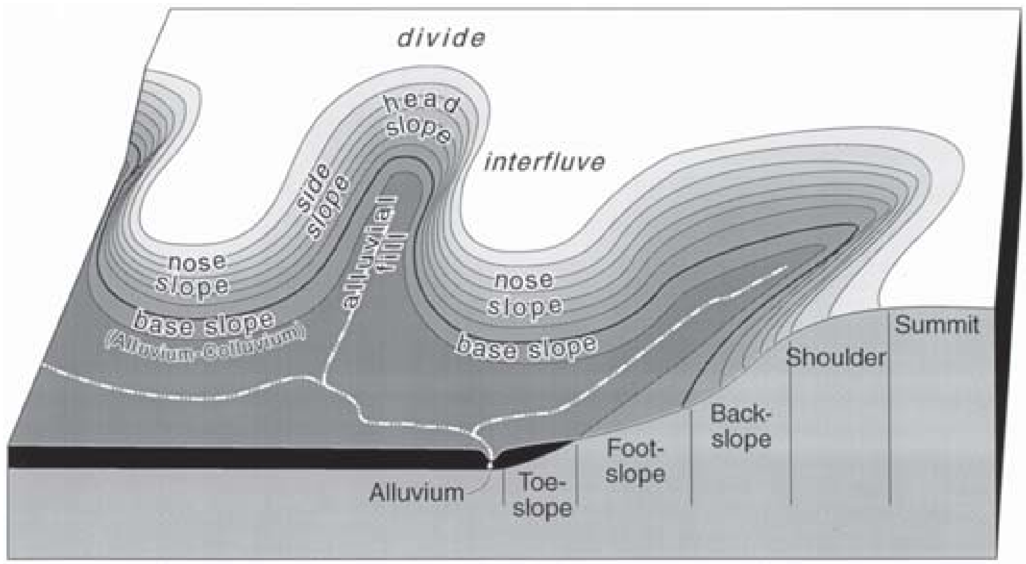

Figure 19.—Landscape relationship of geomorphic components and hillslope positions (modified after Ruhe and Walker, 1968).

Base slope (geomorphology). A geomorphic component of hills (fig. 19) consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Beach deposits. Material, such as sand and gravel, that is generally laid down parallel to an active or relict shoreline of a post-glacial or glacial lake.

Bedding plane. A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed; the adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

Bottom land. An informal term loosely applied to various portions of a flood plain.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush

management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. See Terracettes.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. See Redoximorphic features.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A dense, compact, slowly permeable subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. See Redoximorphic features.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Corrosion (geomorphology). A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divide. (a) The line of separation, or (b) the summit area, or narrow tract of higher ground that constitutes the watershed boundary between two adjacent drainage basins (fig. 19); it divides the surface waters that flow naturally in one direction from those that flow in the opposite direction.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drift. A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Earthy fill. See Mine spoil.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building

up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms. A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay. A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step. An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Footslope. The concave surface at the base of a hillslope (fig. 19). A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway (fig. 19). The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next

crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill (fig. 19).

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

L horizon.—A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Ice-walled lake plain. A relict surface marking the floor of an extinct lake basin that was formed on solid ground and surrounded by stagnant ice in a stable or unstable superglacial environment on stagnation moraines. As the ice melted, the lake plain became perched above the adjacent landscape. The lake plain is well sorted, generally fine textured, stratified deposits.

Igneous rock. Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill (fig. 19); shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. See Redoximorphic features.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Kame moraine. An end moraine that contains numerous kames. A group of kames along the front of a stagnant glacier, commonly comprising the slumped remnants of a formerly continuous outwash plain built up over the foot of rapidly wasting or stagnant ice.

Karst (topography). A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Ksat. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake bed. The bottom of a lake; a lake basin.

Lake plain. A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace. A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength. The soil is not strong enough to support loads.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Masses. See Redoximorphic features.

Meander belt. The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

Meander scar. A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

Meander scroll. One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

Mine spoil. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. A kind of map unit that has little or no natural soil and supports little or no vegetation.

MLRA (major land resource area). A geographic area characterized by a particular pattern of land uses, elevation and topography, soils, climate, water resources, and potential natural vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates

less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. See Redoximorphic features.

Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside (fig. 19). The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash. Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain. An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Parts per million (ppm). The concentration of a substance in the soil, such as phosphorus or potassium, in one million parts of air-dried soil on a weight per weight basis.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Phosphorus. The amount of phosphorus available to plants at a depth of 30 to 42 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available phosphorus are:

Very low	less than 7.5 ppm
Low	7.5 to 13.0 ppm
Medium	13.0 to 22.5 ppm
High	more than 22.5 ppm

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitted outwash plain. An outwash plain marked by many irregular depressions, such as kettles, shallow pits, and potholes, which formed by melting of incorporated ice masses.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings. See Redoximorphic features.

Potassium. The amount of potassium available to plants at a depth of 12 to 24 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available potassium are:

Very low	less than 50 ppm
Low	50 to 79 ppm
Medium	79 to 125 ppm
High	more than 125 ppm

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.
Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.
Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.
Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.
Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.
Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.
Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.
Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.
Root zone. The part of the soil that can be penetrated by plant roots.
Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.
Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.
Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.
Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturated hydraulic conductivity (Ksat). See Permeability.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The convex, erosional surface near the top of a hillslope (fig. 19). A shoulder is a transition from summit to backslope.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside (fig. 19). The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

Slickensides (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stagnation moraine. A body of drift released by the melting of a glacier that ceased flowing. Commonly but not always occurs near ice margins; composed of till, ice-contact stratified drift, and small areas of glacial lake sediment. Typical landforms are knob-and-kettle topography, locally including ice-walled lake plains.

Stone line. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial.

Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope (fig. 19). It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Swale. A slight depression in the midst of generally level land. A shallow depression in an undulating ground moraine caused by uneven glacial deposition.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine. An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

Terrace (conservation). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terracettes. Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Till. Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

Till plain. An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The gently inclined surface at the base of a hillslope (fig. 19). Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by

atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

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University Extension

In cooperation with Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; and Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship

Soil Survey of Crawford County, Iowa

Part II

How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of soils called associations. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the soil associations on the color-coded map legend, and then refer to the section **General Soil Map Units** in Part I for a general description of the soils in your area.

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets** in Part III. Note the number of the map sheet, and turn to that sheet. Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. The **Contents** in Part I lists the map units and shows the page where each map unit is described.

The **Contents** in Part II shows which table has information on a specific land use or soil property for each detailed soil map unit. Also, see the **Contents** in Part I and Part II for other sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2002. Soil names and descriptions were approved in 2004. This survey was made cooperatively by the Natural Resources Conservation Service; the Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship. The survey is part of the technical assistance furnished to the Crawford County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Contour farming and terraces in an area of Marshall soils. Corn and soybeans are planted in this area in alternate seasons.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

Contents

Issued 2007

Soil Survey of
Crawford County, Iowa

Introduction to Part II

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

This part of the soil survey includes interpretations for various uses of the soils and data on soil properties. This information can be used to plan the use and management of soils for crops and pasture or as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of gravel, sand, reclamation material, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The table “Classification of the Soils” is at the end of this section. Information about the system of soil taxonomy used by the Natural Resources Conservation Service is available in Part I of this publication. The extent of the map units in this survey area is shown in the table “Acreage and Proportionate Extent of the Soils.”

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text in Part I for a description of those characteristics that are outside the range of the series)

Soil name	Family or higher taxonomic class
Ackmore	Fine-silty, mixed, superactive, nonacid, mesic Mollic Fluvaquents
Burchard	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Chute	Mixed, mesic Typic Udipsamments
Colo	Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls
Danbury	Fine-silty, mixed, superactive, nonacid, mesic Oxyaquic Udifluvents
Dow	Fine-silty, mixed, superactive, calcareous, mesic Typic Udorthents
*Exira	Fine-silty, mixed, superactive, mesic Dystric Eutrudepts
Hawick	Sandy, mixed, mesic Entic Hapludolls
Ida	Fine-silty, mixed, superactive, calcareous, mesic Typic Udorthents
Judson	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Kennebec	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Knox	Fine-silty, mixed, superactive, mesic Mollic Hapludalfs
Liston	Fine-loamy, mixed, superactive, mesic Typic Eutrudepts
Marshall	Fine-silty, mixed, superactive, mesic Typic Hapludolls
*Marshall	Fine-silty, mixed, superactive, mesic Dystric Eutrudepts
Monona	Fine-silty, mixed, superactive, mesic Typic Hapludolls
*Monona	Fine-silty, mixed, superactive, mesic Dystric Eutrudepts
Napier	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Nodaway	Fine-silty, mixed, superactive, nonacid, mesic Mollic Udifluvents
Rawles	Fine-silty, mixed, superactive, calcareous, mesic Oxyaquic Udifluvents
Smithland	Fine-silty, mixed, superactive, mesic Aquic Cumulic Hapludolls
Zook	Fine, smectitic, mesic Cumulic Vertic Endoaquolls

Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1C	Ida silt loam, 5 to 9 percent slopes	664	0.1
1C3	Ida silt loam, 5 to 9 percent slopes, severely eroded	10,458	2.3
1D3	Ida silt loam, 9 to 14 percent slopes, severely eroded	7,800	1.7
1E3	Ida silt loam, 14 to 20 percent slopes, severely eroded	7,714	1.7
1F3	Ida silt loam, 20 to 30 percent slopes, severely eroded	1,051	0.2
8B	Judson silty clay loam, 2 to 5 percent slopes	20,632	4.5
8C	Judson silty clay loam, 5 to 9 percent slopes	7,399	1.6
9	Marshall silty clay loam, 0 to 2 percent slopes	92	*
9B	Marshall silty clay loam, 2 to 5 percent slopes	10,969	2.4
9B2	Marshall silty clay loam, 2 to 5 percent slopes, moderately eroded	4,618	1.0
9C	Marshall silty clay loam, 5 to 9 percent slopes	4,449	1.0
9C2	Marshall silty clay loam, 5 to 9 percent slopes, moderately eroded	29,590	6.5
9D	Marshall silty clay loam, 9 to 14 percent slopes	331	*
9D2	Marshall silty clay loam, 9 to 14 percent slopes, moderately eroded	40,384	8.8
9E2	Marshall silty clay loam, 14 to 18 percent slopes, moderately eroded	6,917	1.5
9E3	Marshall silty clay loam, 14 to 18 percent slopes, severely eroded	5,687	1.2
10B	Monona silt loam, 2 to 5 percent slopes	1,049	0.2
10B2	Monona silt loam, 2 to 5 percent slopes, moderately eroded	781	0.2
10C2	Monona silt loam, 5 to 9 percent slopes, moderately eroded	10,153	2.2
10D2	Monona silt loam, 9 to 14 percent slopes, moderately eroded	11,408	2.5
10D3	Monona silt loam, 9 to 14 percent slopes, severely eroded	2,776	0.6
10E2	Monona silt loam, 14 to 20 percent slopes, moderately eroded	6,320	1.4
10E3	Monona silt loam, 14 to 20 percent slopes, severely eroded	4,813	1.1
10F2	Monona silt loam, 20 to 30 percent slopes, moderately eroded	1,502	0.3
10F3	Monona silt loam, 20 to 30 percent slopes, severely eroded	1,387	0.3
12B	Napier silt loam, 2 to 5 percent slopes	7,557	1.7
12C	Napier silt loam, 5 to 9 percent slopes	7,297	1.6
17B	Napier-Kennebec-Nodaway complex, 2 to 5 percent slopes	7,743	1.7
22D2	Dow silt loam, 9 to 14 percent slopes, moderately eroded	265	*
22D3	Dow silt loam, 9 to 14 percent slopes, severely eroded	798	0.2
22E3	Dow silt loam, 14 to 20 percent slopes, severely eroded	974	0.2
26	Kennebec silty clay loam, 0 to 2 percent slopes, occasionally flooded	2,393	0.5
35D2	Liston-Burchard complex, 9 to 14 percent slopes, moderately eroded	407	*
35E2	Liston-Burchard complex, 14 to 18 percent slopes, moderately eroded	5,269	1.2
35F2	Liston-Burchard complex, 18 to 25 percent slopes, moderately eroded	2,695	0.6
35G	Liston-Burchard complex, 25 to 40 percent slopes	371	*
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded	859	0.2
54+	Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	622	0.1
59D2	Burchard clay loam, 9 to 14 percent slopes, moderately eroded	1,941	0.4
59E2	Burchard clay loam, 14 to 18 percent slopes, moderately eroded	1,283	0.3
99C2	Exira silty clay loam, 5 to 9 percent slopes, moderately eroded	2,818	0.6
99D2	Exira silty clay loam, 9 to 14 percent slopes, moderately eroded	12,019	2.6
99E2	Exira silty clay loam, 14 to 18 percent slopes, moderately eroded	1,516	0.3
100B	Monona silty clay loam, 2 to 5 percent slopes	4,444	1.0
100C2	Monona silty clay loam, 5 to 9 percent slopes, moderately eroded	24,311	5.3
100D2	Monona silty clay loam, 9 to 14 percent slopes, moderately eroded	34,477	7.5
100D3	Monona silty clay loam, 9 to 14 percent slopes, severely eroded	8,502	1.9
100E2	Monona silty clay loam, 14 to 20 percent slopes, moderately eroded	13,727	3.0
100E3	Monona silty clay loam, 14 to 20 percent slopes, severely eroded	8,306	1.8
100F2	Monona silty clay loam, 20 to 30 percent slopes, moderately eroded	1,802	0.4
100F3	Monona silty clay loam, 20 to 30 percent slopes, severely eroded	1,499	0.3
111D3	Dow-Monona complex, 9 to 14 percent slopes, severely eroded	1,024	0.2
111E3	Dow-Monona complex, 14 to 20 percent slopes, severely eroded	1,678	0.4
125D3	Ida-Chute complex, 9 to 14 percent slopes, severely eroded	324	*
125E3	Ida-Chute complex, 14 to 20 percent slopes, severely eroded	301	*
133	Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded	993	0.2
133+	Colo silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	2,361	0.5
212	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded	4,955	1.1
212+	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	2,933	0.6
220	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded	7,487	1.6
266	Smithland silty clay loam, 0 to 2 percent slopes, occasionally flooded	1,129	0.2

See footnote at end of table.

Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
266+	Smithland silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	799	0.2
268D	Knox silt loam, 9 to 14 percent slopes	257	*
268E	Knox silt loam, 14 to 20 percent slopes	726	0.2
268F	Knox silt loam, 20 to 30 percent slopes	1,031	0.2
430	Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded	1,603	0.4
431B	Judson-Ackmore-Colo, overwash, complex, 2 to 5 percent slopes	52,271	11.4
509B	Marshall silty clay loam, terrace, 2 to 5 percent slopes	893	0.2
509C	Marshall silty clay loam, terrace, 5 to 9 percent slopes	137	*
509C2	Marshall silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded	483	0.1
509D2	Marshall silty clay loam, terrace, 9 to 14 percent slopes, moderately eroded	302	*
509E2	Marshall silty clay loam, terrace, 14 to 20 percent slopes, moderately eroded	70	*
510	Monona silt loam, terrace, 0 to 2 percent slopes	1,487	0.3
510B	Monona silt loam, terrace, 2 to 5 percent slopes	1,264	0.3
510C2	Monona silt loam, terrace, 5 to 9 percent slopes, moderately eroded	688	0.2
510D2	Monona silt loam, terrace, 9 to 14 percent slopes, moderately eroded	333	*
510E2	Monona silt loam, terrace, 14 to 20 percent slopes, moderately eroded	216	*
630	Danbury silt loam, 0 to 2 percent slopes, occasionally flooded	6,914	1.5
670	Rawles silt loam, 0 to 2 percent slopes, occasionally flooded	633	0.1
700	Monona silty clay loam, terrace, 0 to 2 percent slopes	195	*
700B	Monona silty clay loam, terrace, 2 to 5 percent slopes	1,531	0.3
700C2	Monona silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded	761	0.2
700D2	Monona silty clay loam, terrace, 9 to 14 percent slopes, moderately eroded	382	*
717D	Napier-Gullied land complex, 5 to 14 percent slopes	944	0.2
740D	Hawick gravelly sandy loam, 9 to 14 percent slopes	250	*
740E	Hawick gravelly sandy loam, 14 to 18 percent slopes	202	*
740F	Hawick gravelly sandy loam, 18 to 25 percent slopes	225	*
980C	Judson-Gullied land complex, 5 to 9 percent slopes	1,371	0.3
1220	Nodaway silt loam, channeled, 0 to 2 percent slopes, frequently flooded	2,290	0.5
5010	Pits, sand and gravel	125	*
5040	Udorthents, loamy	739	0.2
5080	Udorthents, sanitary landfill	113	*
AW	Animal waste lagoon	14	*
SL	Sewage lagoon	156	*
W	Water	1,771	0.4
	Total	457,200	100.0

* Less than 0.1 percent.

Agronomy

This section provides some general information about managing the soils for crops and for hay and pasture. The Iowa corn suitability rating system and the system of land capability classification used by the Natural Resources Conservation Service are explained, and the estimated yields of the main crops and hay and pasture plants are listed for each soil. Prime farmland and other important farmlands are described, and interpretations for agricultural waste management are provided.

Planners of management systems for individual fields or farms should consider obtaining specific information from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland Management Considerations

The management concerns affecting the use of the detailed soil map units in the county for crops are shown in the table “Cropland Management Considerations” at the end of this section. The main concerns in managing nonirrigated cropland are conserving moisture, controlling wind erosion and water erosion, and maintaining soil fertility.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water infiltration rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control wind erosion and water erosion. Conservation tillage, stripcropping, field windbreaks, contour farming, conservation cropping systems, crop residue management, terraces, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining soil fertility include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the considerations shown in the table cannot be easily overcome. These are channels, flooding, gullies, and ponding.

Additional considerations are as follows:

Lime content, limited available water capacity, limited content of organic matter, potential poor tilth and compaction, and restricted permeability.—These limitations can be minimized by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer to soils that have a high content of lime.

Potential for ground-water contamination.—The proper use of nutrients and pesticides can reduce the risk of ground-water contamination.

Potential for surface-water contamination.—The risk of surface-water contamination can be reduced by the proper use of nutrients and pesticides and by conservation farming practices that reduce the runoff rate.

Surface crusting.—This limitation retards seedling development after periods of heavy rainfall.

Surface rock fragments.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Surface stones.—Stones or boulders on or near the surface can hinder normal tillage unless they are removed.

Salt content.—In areas where this is a limitation, only salt-tolerant crops should be grown.

On irrigated soils the main management concerns are efficient water use, nutrient management, control of erosion, pest and weed control, and timely planting and harvesting for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can increase wetness and soil salinity.

Explanation of Criteria

Acid soil.—The pH is less than 6.1.

Channeled.—The word “channeled” is included in the map unit name.

Dense layer.—The bulk density is 1.80 g/cc or greater within the soil profile.

Depth to rock.—The depth to bedrock is less than 40 inches.

Eroded.—The word “eroded” is included in the map unit name.

Excessive permeability.—Saturated hydraulic conductivity is 42 micrometers per second or more within the soil profile.

Flooding.—Flooding is occasional, frequent, or very frequent.

Gullied.—The word “gullied” is included in the map unit name.

High content of organic matter.—The surface layer has more than 20 percent organic matter.

Lime content.—The pH is 7.4 or more in the surface layer, or the wind erodibility group is 4L.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

Limited content of organic matter.—The content of organic matter is 2 percent or less in the surface layer.

Ponding.—Ponding duration is assigned to the map unit component. Water is above the surface.

Potential poor tilth and compaction.—The content of clay is 27 percent or more in the surface layer.

Potential for ground-water contamination (by nutrients or pesticides).—The depth to a seasonal high water table is 4 feet or less, the saturated hydraulic conductivity of any layer is more than 42 micrometers per second, or the depth to bedrock is less than 60 inches.

Potential for surface-water contamination (by nutrients or pesticides).—The map unit component is occasionally, frequently, or very frequently flooded, is subject to ponding, is assigned to hydrologic group C or D and has a slope of more than 2 percent, is assigned to hydrologic group A and has a slope of more than 6 percent, or is assigned to hydrologic group B, has a slope of 3 percent or more, and has a K factor of more than 0.17.

Previously eroded.—The word “eroded” is included in the map unit name.

Restricted permeability.—Saturated hydraulic conductivity is less than 0.42 micrometer per second within the soil profile.

Salt content.—The electrical conductivity is 4 or more in the surface layer or 8 or more within a depth of 30 inches.

Slope (equipment limitation).—The slope is more than 15 percent.

Surface crusting.—The content of clay is 27 percent or more and the content of organic matter is 2 percent or less in the surface layer.

Surface rock fragments (equipment limitation).—The terms describing the texture of the surface layer include any rock fragment modifier, except for gravelly, channery, stony, very stony, extremely stony, bouldery, very bouldery, and extremely bouldery.

Surface stones (equipment limitation).—The word “stony” or “bouldery” is included in the description of the surface layer, or 0.01 to 0.1 percent of the surface is covered by stones or boulders.

Water erosion.—Either the slope is 6 percent or more, or the slope is more than 3 percent and less than 6 percent and the surface layer is not sandy.

Water table.—A water table is within 2.5 feet of the surface.

Wind erosion.—The wind erodibility group is 1, 2, 3, or 4L.

Hydrologic groups are described under the heading “Water Features.” Erosion factors (e.g., K factor) and wind erodibility groups are described under the heading “Physical Properties.”

Cropland Management Considerations

(See text for a description of the considerations listed in this table)

Map symbol and soil name	Pct. of map unit	Cropland management considerations
1C:		
Ida	95	Lime content Potential for surface-water contamination Water erosion Wind erosion
1C3:		
Ida, severely eroded	80	Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
1D3:		
Ida, severely eroded	80	Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
1E3:		
Ida, severely eroded	70	Slope Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
1F3:		
Ida, severely eroded	70	Slope Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
8B:		
Judson	80	Potential poor tilth and compaction Potential for surface-water contamination Water erosion
8C:		
Judson	95	Potential poor tilth and compaction Potential for surface-water contamination Water erosion
9:		
Marshall	95	Potential poor tilth and compaction
9B:		
Marshall	100	Potential poor tilth and compaction Potential for surface-water contamination Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
9B2:		
Marshall, moderately eroded	85	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
9C:		
Marshall	90	Potential poor tilth and compaction Potential for surface-water contamination Water erosion
9C2:		
Marshall, moderately eroded	80	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
9D:		
Marshall	85	Potential poor tilth and compaction Potential for surface-water contamination Water erosion
9D2:		
Marshall, moderately eroded	70	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
9E2:		
Marshall, moderately eroded	70	Slope Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
9E3:		
Marshall, severely eroded	75	Slope Limited content of organic matter Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Surface crusting Water erosion
10B:		
Monona	100	Potential for surface-water contamination Water erosion
10B2:		
Monona, moderately eroded	80	Potential for surface-water contamination Previously eroded Water erosion
10C2:		
Monona, moderately eroded	75	Potential for surface-water contamination Previously eroded Water erosion
10D2:		
Monona, moderately eroded	60	Potential for surface-water contamination Previously eroded Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
10D3:		
Monona, severely eroded------	95	Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion
10E2:		
Monona, moderately eroded----	50	Slope Potential for surface-water contamination Previously eroded Water erosion
10E3:		
Monona, severely eroded------	60	Slope Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion
10F2:		
Monona, moderately eroded----	45	Slope Potential for surface-water contamination Previously eroded Water erosion
10F3:		
Monona, severely eroded------	70	Slope Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion
12B:		
Napier-----------------------	85	Potential for surface-water contamination Water erosion
12C:		
Napier-----------------------	95	Potential for surface-water contamination Water erosion
17B:		
Napier-----------------------	50	Potential for surface-water contamination Water erosion
Kennebec, frequently flooded	20	Flooding Potential for ground-water contamination Potential for surface-water contamination Water erosion
Nodaway, frequently flooded--	15	Flooding Potential for ground-water contamination Potential for surface-water contamination Water erosion
22D2:		
Dow, moderately eroded-------	90	Lime content Potential for surface-water contamination Previously eroded Water erosion Wind erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
22D3:		
Dow, severely eroded---------	90	Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
22E3:		
Dow, severely eroded---------	80	Slope Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
26:		
Kennebec, occasionally flooded--------------------	95	Flooding Excessive permeability Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination
35D2:		
Liston, moderately eroded----	50	Lime content Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Burchard, moderately eroded--	35	Potential for surface-water contamination Previously eroded Water erosion
35E2:		
Liston, moderately eroded----	50	Slope Lime content Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Burchard, moderately eroded--	35	Slope Potential for surface-water contamination Previously eroded Water erosion
35F2:		
Liston, moderately eroded----	40	Slope Lime content Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Burchard, moderately eroded--	30	Slope Potential for surface-water contamination Previously eroded Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
35G:		
Liston	45	Slope Lime content Potential for surface-water contamination Water erosion Wind erosion
Burchard	35	Slope Potential for surface-water contamination Water erosion
54:		
Zook, occasionally flooded	90	Flooding Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
54+:		
Zook, overwash, occasionally flooded	90	Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
59D2:		
Burchard, moderately eroded	55	Potential for surface-water contamination Previously eroded Water erosion
59E2:		
Burchard, moderately eroded	55	Slope Potential for surface-water contamination Previously eroded Water erosion
99C2:		
Exira, moderately eroded	80	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
99D2:		
Exira, moderately eroded	50	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
99E2:		
Exira, moderately eroded	45	Slope Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
100B:		
Monona	75	Potential poor tilth and compaction Potential for surface-water contamination Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
100C2:		
Monona, moderately eroded----	50	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
100D2:		
Monona, moderately eroded----	45	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
100D3:		
Monona, severely eroded------	45	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
100E2:		
Monona, moderately eroded----	45	Slope Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
100E3:		
Monona, severely eroded------	45	Slope Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion
100F2:		
Monona, moderately eroded----	55	Slope Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
100F3:		
Monona, severely eroded------	70	Slope Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
111D3:		
Dow, severely eroded---------	55	Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Monona, severely eroded------	40	Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
111E3:		
Dow, severely eroded	55	Slope Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Monona, severely eroded	40	Slope Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
125D3:		
Ida, severely eroded	50	Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Chute, severely eroded	30	Excessive permeability Lime content Limited available water capacity Limited content of organic matter Potential for ground-water contamination Potential for surface-water contamination Previously eroded Water erosion Wind erosion
125E3:		
Ida, severely eroded	50	Slope Lime content Limited content of organic matter Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Chute, severely eroded	30	Slope Excessive permeability Lime content Limited available water capacity Limited content of organic matter Potential for ground-water contamination Potential for surface-water contamination Previously eroded Water erosion Wind erosion
133:		
Colo, occasionally flooded	85	Flooding Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
133+:		
Colo, overwash, occasionally flooded	85	Flooding Limited content of organic matter Potential for ground-water contamination Potential for surface-water contamination Water table
212:		
Kennebec, occasionally flooded	70	Flooding Potential for ground-water contamination Potential for surface-water contamination
212+:		
Kennebec, overwash, occasionally flooded	90	Flooding Potential for ground-water contamination Potential for surface-water contamination
220:		
Nodaway, occasionally flooded	75	Flooding Potential for ground-water contamination Potential for surface-water contamination
266:		
Smithland, occasionally flooded	85	Flooding Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
266+:		
Smithland, overwash, occasionally flooded	75	Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
268D:		
Knox	85	Potential for surface-water contamination Water erosion
268E:		
Knox	80	Slope Potential for surface-water contamination Water erosion
268F:		
Knox	75	Slope Potential for surface-water contamination Water erosion
430:		
Ackmore, occasionally flooded	75	Flooding Potential for ground-water contamination Potential for surface-water contamination Water table

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
431B:		
Judson	55	Potential poor tilth and compaction Potential for surface-water contamination Water erosion
Ackmore, frequently flooded	25	Flooding Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
Colo, overwash, frequently flooded	15	Flooding Limited content of organic matter Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
509B:		
Marshall, terrace	90	Potential poor tilth and compaction Potential for surface-water contamination Water erosion
509C:		
Marshall, terrace	85	Potential poor tilth and compaction Potential for surface-water contamination Water erosion
509C2:		
Marshall, terrace, moderately eroded	65	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
509D2:		
Marshall, terrace, moderately eroded	65	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
509E2:		
Marshall, terrace, moderately eroded	65	Slope Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
510:		
Monona, terrace	100	No major considerations
510B:		
Monona, terrace	60	Potential for surface-water contamination Water erosion
510C2:		
Monona, terrace, moderately eroded	75	Potential for surface-water contamination Previously eroded Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
510D2:		
Monona, terrace, moderately eroded	75	Potential for surface-water contamination Previously eroded Water erosion
510E2:		
Monona, terrace, moderately eroded	75	Slope Potential for surface-water contamination Previously eroded Water erosion
630:		
Danbury, occasionally flooded	80	Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
670:		
Rawles, occasionally flooded	80	Flooding Lime content Potential for ground-water contamination Potential for surface-water contamination Wind erosion
700:		
Monona, terrace	100	Potential poor tilth and compaction
700B:		
Monona, terrace	75	Potential poor tilth and compaction Potential for surface-water contamination Water erosion
700C2:		
Monona, terrace, moderately eroded	50	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
700D2:		
Monona, terrace, moderately eroded	60	Potential poor tilth and compaction Potential for surface-water contamination Previously eroded Water erosion
717D:		
Napier	50	Gullied Potential for surface-water contamination Water erosion
Gullied land, frequently flooded	35	Not applicable
740D:		
Hawick	90	Excessive permeability Limited available water capacity Limited content of organic matter Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
740E:		
Hawick	90	Slope Excessive permeability Limited available water capacity Limited content of organic matter Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
740F:		
Hawick	90	Slope Excessive permeability Limited available water capacity Limited content of organic matter Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
980C:		
Judson	55	Gullied Potential poor tilth and compaction Potential for surface-water contamination Water erosion
Gullied land, frequently flooded	35	Not applicable
1220:		
Nodaway, channeled, frequently flooded	80	Flooding Channeled Potential for ground-water contamination Potential for surface-water contamination
5010:		
Pits, sand and gravel	100	Not applicable
5040:		
Udorthents	100	Onsite investigation required
5080:		
Udorthents	100	Not applicable
AW:		
Animal waste lagoon	100	Not applicable
SL:		
Sewage lagoon	100	Not applicable
W:		
Water	100	Not applicable

Crop Yield Estimates

The tables “Land Capability, Corn Suitability Rating, and Yields per Acre of Crops” and “Land Capability and Yields per Acre of Pasture” are described in this section. Crops other than those shown in the tables are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forestland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the

soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, or wildlife habitat.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

[Reference: United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. USDA Handbook 210.]

Corn Suitability Rating

The corn suitability rating (CSR) system was developed in Iowa to rate the productivity of each different kind of soil for row crops. CSRs provide a relative ranking of all soils mapped in the State of Iowa. They can be used to compare the potential yield production of one soil with that of other soils. Ratings range from 5 to 100. A rating of 5 indicates severe limitations for row crop production. Soil properties and weather conditions are the dominant factors that affect productivity.

Crop Yields

The average yields per acre that can be expected of the principal crops under a high level of management are shown in the table. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Pasture Yields

Some pasture yields are expressed in the table in terms of animal unit months. An animal unit month (AUM) is the amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about forage yields other than those shown in the table.

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops

(The following crop yield estimates are based on a high level of management and are determined through recent research conducted by Iowa State University. They are for nonirrigated areas. See text for additional information. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
1C----------------------- Ida	95	3e	60	143	55	90
1C3---------------------- Ida, severely eroded	80	3e	55	140	34	56
1D3---------------------- Ida, severely eroded	80	3e	45	131	51	83
1E3---------------------- Ida, severely eroded	70	4e	35	113	47	76
1F3---------------------- Ida, severely eroded	70	6e	15	---	---	---
8B----------------------- Judson	80	2e	81	185	66	108
8C----------------------- Judson	95	3e	66	170	64	104
9------------------------ Marshall	95	1	86	189	68	111
9B----------------------- Marshall	100	2e	81	180	67	109
9B2---------------------- Marshall, moderately eroded	85	2e	79	174	65	106
9C----------------------- Marshall	90	3e	66	168	65	105
9C2---------------------- Marshall, moderately eroded	80	3e	64	164	62	102
9D----------------------- Marshall	85	3e	56	156	60	99
9D2---------------------- Marshall, moderately eroded	70	3e	54	153	58	96
9E2---------------------- Marshall, moderately eroded	70	4e	44	133	52	85
9E3---------------------- Marshall, severely eroded	75	4e	41	128	49	81
10B---------------------- Monona	100	2e	80	169	63	103

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
10B2: Monona, moderately eroded	80	2e	78	162	61	100
10C2: Monona, moderately eroded	75	3e	63	164	59	96
10D2: Monona, moderately eroded	60	3e	53	141	55	89
10D3: Monona, severely eroded	95	3e	50	141	52	86
10E2: Monona, moderately eroded	50	4e	43	127	50	82
10E3: Monona, severely eroded	60	4e	40	125	46	75
10F2: Monona, moderately eroded	45	6e	23	---	---	---
10F3: Monona, severely eroded	70	6e	20	---	---	---
12B: Napier	85	2e	80	161	63	103
12C: Napier	95	3e	65	146	61	99
17B:			57	148	51	84
Napier	50	2e				
Kennebec, frequently flooded	20	2w				
Nodaway, frequently flooded	15	2w				
22D2: Dow, moderately eroded	90	3e	46	120	43	71
22D3: Dow, severely eroded	90	3e	43	113	41	67
22E3: Dow, severely eroded	80	4e	43	97	34	56
26: Kennebec, occasionally flooded	95	2w	85	129	65	105
35D2:			40	123	42	69
Liston, moderately eroded	50	3e				
Burchard, moderately eroded	35	3e				

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
35E2			30	71	36	58
Liston, moderately eroded	50	4e				
Burchard, moderately eroded	35	4e				
35F2			8	---	---	---
Liston, moderately eroded	40	6e				
Burchard, moderately eroded	30	6e				
35G			5	---	---	---
Liston	45	7e				
Burchard	35	7e				
54 Zook, occasionally flooded	90	2w	73	118	55	89
54+ Zook, overwash, occasionally flooded	90	2w	78	125	58	94
59D2 Burchard, moderately eroded	55	3e	58	89	46	75
59E2 Burchard, moderately eroded	55	4e	33	75	39	64
99C2 Exira, moderately eroded	80	3e	61	167	57	93
99D2 Exira, moderately eroded	50	3e	51	149	53	86
99E2 Exira, moderately eroded	45	4e	41	135	46	75
100B Monona	75	2e	80	158	63	103
100C2 Monona, moderately eroded	50	3e	63	153	59	96
100D2 Monona, moderately eroded	45	3e	53	140	55	89
100D3 Monona, severely eroded	45	3e	50	145	52	86
100E2 Monona, moderately eroded	45	4e	43	126	48	79
100E3 Monona, severely eroded	45	4e	40	127	46	75

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
100F2: Monona, moderately eroded	55	6e	23	---	---	---
100F3: Monona, severely eroded	70	7e	20	---	---	---
111D3:			45	129	46	75
Dow, severely eroded	55	3e				
Monona, severely eroded	40	3e				
111E3:			36	103	39	64
Dow, severely eroded	55	4e				
Monona, severely eroded	40	4e				
125D3:			23	90	29	48
Ida, severely eroded	50	3e				
Chute, severely eroded	30	7s				
125E3:			13	80	26	42
Ida, severely eroded	50	4e				
Chute, severely eroded	30	7s				
133: Colo, occasionally flooded	85	2w	80	170	65	105
133+: Colo, overwash, occasionally flooded	85	2w	85	174	66	108
212: Kennebec, occasionally flooded	70	2w	85	192	65	105
212+: Kennebec, overwash, occasionally flooded	90	2w	90	177	65	105
220: Nodaway, occasionally flooded	75	2w	86	177	65	105
266: Smithland, occasionally flooded	85	2w	85	162	65	105
266+: Smithland, overwash, occasionally flooded	75	2w	90	170	65	105
268D: Knox	85	3e	50	129	53	86
268E: Knox	80	4e	40	116	46	75
268F: Knox	75	6e	20	---	---	---

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
430---------------------- Ackmore, occasionally flooded	75	2w	86	168	68	111
431B---------------------			66	180	55	89
Judson------------------	55	2e				
Ackmore, frequently flooded----------------	25	2w				
Colo, overwash, frequently flooded-----	15	2w				
509B--------------------- Marshall, terrace	90	2e	76	185	67	109
509C--------------------- Marshall, terrace	85	3e	68	180	65	105
509C2-------------------- Marshall, terrace, moderately eroded	65	3e	64	176	62	102
509D2-------------------- Marshall, terrace, moderately eroded	65	3e	54	167	54	96
509E2-------------------- Marshall, terrace, moderately eroded	65	4e	44	156	52	85
510---------------------- Monona, terrace	100	1	85	179	65	105
510B--------------------- Monona, terrace	60	2e	80	171	63	103
510C2-------------------- Monona, terrace, moderately eroded	75	3e	63	165	59	96
510D2-------------------- Monona, terrace, moderately eroded	75	3e	53	149	55	89
510E2-------------------- Monona, terrace, moderately eroded	75	4e	43	133	48	79
630---------------------- Danbury, occasionally flooded	80	2w	85	178	65	105
670---------------------- Rawles, occasionally flooded	80	2w	80	144	59	96
700---------------------- Monona, terrace	100	1	85	166	65	105
700B--------------------- Monona, terrace	75	2e	80	166	63	103

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
700C2-------------------- Monona, terrace, moderately eroded	50	3e	63	166	59	96
700D2-------------------- Monona, terrace, moderately eroded	60	3e	53	152	55	89
717D---------------------			5	---	---	---
Napier------------------	50	3e				
Gullied land, frequently flooded----------------	35	7e				
740D--------------------- Hawick	90	4s	12	65	30	49
740E--------------------- Hawick	90	6s	5	---	---	---
740F--------------------- Hawick	90	7s	5	---	---	---
980C---------------------			5	---	---	---
Judson------------------	55	3e				
Gullied land, frequently flooded----------------	35	7e				
1220--------------------- Nodaway, channeled, frequently flooded	80	5w	25	---	---	---
5010. Pits, sand and gravel						
5040. Udorthents						
5080. Udorthents						
AW. Animal waste lagoon						
SL. Sewage lagoon						
W. Water						

Land Capability and Yields per Acre of Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass	Bromegrass-alfalfa
			Tons	AUM*	AUM*	AUM*
1C----------------------- Ida	95	3e	5.2	5.1	3.1	5.3
1C3---------------------- Ida, severely eroded	80	3e	4.7	4.6	2.7	4.8
1D3---------------------- Ida, severely eroded	80	3e	4.8	4.6	2.8	4.9
1E3---------------------- Ida, severely eroded	70	4e	4.4	4.2	2.6	4.5
1F3---------------------- Ida, severely eroded	70	6e	3.1	3.2	1.2	3.1
8B----------------------- Judson	80	2e	6.2	6.2	3.7	6.3
8C----------------------- Judson	95	3e	6.0	5.6	3.5	6.1
9------------------------ Marshall	95	1	6.4	5.1	3.8	6.5
9B----------------------- Marshall	100	2e	6.3	5.1	3.7	6.4
9B2---------------------- Marshall, moderately eroded	85	2e	6.1	5.1	3.6	6.2
9C----------------------- Marshall	90	3e	6.1	6.0	3.5	6.2
9C2---------------------- Marshall, moderately eroded	80	3e	5.9	5.1	3.5	6.0
9D----------------------- Marshall	85	3e	5.7	5.1	3.4	5.8
9D2---------------------- Marshall, moderately eroded	70	3e	5.5	5.1	3.3	5.6
9E2---------------------- Marshall, moderately eroded	70	4e	4.9	5.1	2.9	5.0
9E3---------------------- Marshall, severely eroded	75	4e	4.7	5.1	2.8	4.7
10B---------------------- Monona	100	2e	6.0	5.8	3.5	6.0

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass	Bromegrass-alfalfa
			Tons	AUM*	AUM*	AUM*
10B2--------------------- Monona, moderately eroded	80	2e	5.8	5.6	3.4	5.9
10C2--------------------- Monona, moderately eroded	75	3e	5.6	5.5	3.3	5.6
10D2--------------------- Monona, moderately eroded	60	3e	5.2	5.1	3.1	5.2
10D3--------------------- Monona, severely eroded	95	3e	5.0	4.7	2.9	5.0
10E2--------------------- Monona, moderately eroded	50	4e	4.7	4.6	2.8	4.8
10E3--------------------- Monona, severely eroded	60	4e	4.3	4.0	2.6	4.4
10F2--------------------- Monona, moderately eroded	45	6e	3.5	3.4	1.6	3.5
10F3--------------------- Monona, severely eroded	70	6e	3.2	3.0	1.4	3.2
12B---------------------- Napier	85	2e	6.0	5.3	3.5	6.0
12C---------------------- Napier	95	3e	5.8	5.1	3.4	5.8
17B----------------------			4.9	4.5	2.9	4.9
Napier------------------	50	2e				
Kennebec, frequently flooded----------------	20	2w				
Nodaway, frequently flooded----------------	15	2w				
22D2--------------------- Dow, moderately eroded	90	3e	4.1	4.0	2.4	4.2
22D3--------------------- Dow, severely eroded	90	4e	3.9	3.4	2.3	3.9
22E3--------------------- Dow, severely eroded	80	3e	3.2	3.0	1.9	3.3
26----------------------- Kennebec, occasionally flooded	95	2w	6.1	5.1	3.6	6.2
35D2---------------------			4.0	4.2	2.4	4.0
Liston, moderately eroded-----------------	50	3e				
Burchard, moderately eroded-----------------	35	3e				

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass	Bromegrass-alfalfa
			Tons	AUM*	AUM*	AUM*
35E2			3.4	3.2	2.0	3.4
Liston, moderately eroded	50	4e				
Burchard, moderately eroded	35	4e				
35F2			---	3.0	2.5	---
Liston, moderately eroded	40	6e				
Burchard, moderately eroded	30	6e				
35G			---	3.0	2.5	---
Liston	45	7e				
Burchard	35	7e				
54	90	2w	5.2	5.2	3.1	5.2
Zook, occasionally flooded						
54+	90	2w	5.5	5.8	3.2	5.5
Zook, overwash, occasionally flooded						
59D2	55	3e	4.3	4.2	2.6	4.4
Burchard, moderately eroded						
59E2	55	4e	3.7	3.3	2.2	3.7
Burchard, moderately eroded						
99C2	80	3e	5.4	4.1	3.2	5.4
Exira, moderately eroded						
99D2	50	3e	5.0	4.9	2.9	5.1
Exira, moderately eroded						
99E2	45	4e	4.4	4.3	2.6	4.4
Exira, moderately eroded						
100B	75	2e	6.0	5.8	3.5	6.0
Monona						
100C2	50	3e	5.6	5.5	3.3	5.6
Monona, moderately eroded						
100D2	45	3e	5.2	5.1	3.1	5.2
Monona, moderately eroded						
100D3	45	3e	5.0	4.9	2.9	5.0
Monona, severely eroded						
100E2	45	4e	4.5	4.4	2.7	4.6
Monona, moderately eroded						

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass	Bromegrass-alfalfa
			Tons	AUM*	AUM*	AUM*
100E3-------------------- Monona, severely eroded	45	4e	4.3	4.1	2.6	4.4
100F2-------------------- Monona, moderately eroded	55	6e	3.5	3.4	1.6	3.5
100F3-------------------- Monona, severely eroded	70	7e	3.2	3.0	1.4	3.2
111D3--------------------			4.3	4.3	2.6	4.4
Dow, severely eroded----	55	3e				
Monona, severely eroded	40	3e				
111E3--------------------			3.7	3.6	2.2	3.8
Dow, severely eroded----	55	4e				
Monona, severely eroded	40	4e				
125D3--------------------			2.8	2.3	1.6	2.8
Ida, severely eroded----	50	3e				
Chute, severely eroded--	30	7s				
125E3--------------------			2.5	1.8	1.5	2.5
Ida, severely eroded----	50	4e				
Chute, severely eroded--	30	7s				
133---------------------- Colo, occasionally flooded	85	2w	6.1	6.3	3.6	6.2
133+--------------------- Colo, overwash, occasionally flooded	85	2w	6.3	6.5	3.7	6.3
212---------------------- Kennebec, occasionally flooded	70	2w	6.1	6.6	3.6	6.2
212+--------------------- Kennebec, overwash, occasionally flooded	90	2w	6.1	6.6	3.6	6.2
220---------------------- Nodaway, occasionally flooded	75	2w	6.1	5.9	3.6	6.2
266---------------------- Smithland, occasionally flooded	85	2w	6.1	5.9	3.6	6.2
266+--------------------- Smithland, overwash, occasionally flooded	75	2w	6.1	5.9	3.6	6.2
268D--------------------- Knox	85	3e	5.0	4.8	2.9	5.1
268E--------------------- Knox	80	4e	4.4	4.2	2.6	4.4
268F--------------------- Knox	75	6e	3.2	3.0	1.4	3.2

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass	Bromegrass-alfalfa
			Tons	AUM*	AUM*	AUM*
430---------------------- Ackmore, occasionally flooded	75	2w	6.4	6.2	3.8	6.5
431B---------------------			5.2	5.0	3.1	5.2
Judson------------------	55	2e				
Ackmore, frequently flooded----------------	25	2w				
Colo, overwash, frequently flooded-----	15	2w				
509B--------------------- Marshall, terrace	90	2e	6.3	6.2	3.7	6.4
509C--------------------- Marshall, terrace	85	3e	6.1	6.1	3.6	6.2
509C2-------------------- Marshall, terrace, moderately eroded	65	3e	5.9	5.8	3.5	6.0
509D2-------------------- Marshall, terrace, moderately eroded	65	3e	5.5	5.3	3.3	5.6
509E2-------------------- Marshall, terrace, moderately eroded	65	4e	4.9	5.3	2.9	5.0
510---------------------- Monona, terrace	100	1	6.1	6.0	3.6	6.2
510B--------------------- Monona, terrace	60	2e	6.0	5.8	3.5	6.0
510C2-------------------- Monona, terrace, moderately eroded	75	3e	5.6	5.5	3.3	5.6
510D2-------------------- Monona, terrace, moderately eroded	75	3e	5.2	5.0	3.1	5.2
510E2-------------------- Monona, terrace, moderately eroded	75	4e	4.5	4.2	2.7	4.6
630---------------------- Danbury, occasionally flooded	80	2w	6.1	5.9	3.6	6.2
670---------------------- Rawles, occasionally flooded	80	2w	5.6	5.5	3.3	5.6
700---------------------- Monona, terrace	100	1	6.1	6.0	3.6	6.2
700B--------------------- Monona, terrace	75	2e	6.1	6.0	3.6	6.2

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass	Bromegrass-alfalfa
			Tons	AUM*	AUM*	AUM*
700C2-------------------- Monona, terrace, moderately eroded	50	3e	5.6	5.5	3.3	5.6
700D2-------------------- Monona, terrace, moderately eroded	60	3e	5.2	5.2	3.1	5.2
717D---------------------			---	---	---	---
Napier------------------	50	3e				
Gullied land, frequently flooded----------------	35	7e				
740D--------------------- Hawick	90	4s	2.9	1.3	1.7	2.9
740E--------------------- Hawick	90	6s	1.8	0.5	1.1	1.9
740F--------------------- Hawick	90	7s	---	1.0	0.6	---
980C---------------------			---	---	---	---
Judson------------------	55	3e				
Gullied land, frequently flooded----------------	35	7e				
1220--------------------- Nodaway, channeled, frequently flooded	80	5w	3.0	2.7	1.3	3.0
5010. Pits, sand and gravel						
5040. Udorthents						
5080. Udorthents						
AW. Animal waste lagoon						
SL. Sewage lagoon						
W. Water						

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Prime Farmland and Other Important Farmlands

The table “Prime Farmland and Other Important Farmlands” lists the map units in the survey area that are considered prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation’s food supply.

Prime farmland is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

For some soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally,

this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Prime Farmland and Other Important Farmlands

(Only the soils considered prime or important farmland are listed. Urban or built-up areas of the soils listed are not considered prime or important farmland. If a soil is prime or important farmland only under certain conditions, such as "where drained," those conditions are specified)

Map symbol	Map unit name	Farmland classification
1C	Ida silt loam, 5 to 9 percent slopes	Farmland of statewide importance
1C3	Ida silt loam, 5 to 9 percent slopes, severely eroded	Farmland of statewide importance
1D3	Ida silt loam, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
1E3	Ida silt loam, 14 to 20 percent slopes, severely eroded	Farmland of statewide importance
8B	Judson silty clay loam, 2 to 5 percent slopes	Prime farmland
8C	Judson silty clay loam, 5 to 9 percent slopes	Farmland of statewide importance
9	Marshall silty clay loam, 0 to 2 percent slopes	Prime farmland
9B	Marshall silty clay loam, 2 to 5 percent slopes	Prime farmland
9B2	Marshall silty clay loam, 2 to 5 percent slopes, moderately eroded	Farmland of statewide importance
9C	Marshall silty clay loam, 5 to 9 percent slopes	Farmland of statewide importance
9C2	Marshall silty clay loam, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
9D	Marshall silty clay loam, 9 to 14 percent slopes	Farmland of statewide importance
9D2	Marshall silty clay loam, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
9E2	Marshall silty clay loam, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
9E3	Marshall silty clay loam, 14 to 18 percent slopes, severely eroded	Farmland of statewide importance
10B	Monona silt loam, 2 to 5 percent slopes	Prime farmland
10B2	Monona silt loam, 2 to 5 percent slopes, moderately eroded	Prime farmland
10C2	Monona silt loam, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
10D2	Monona silt loam, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
10D3	Monona silt loam, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
10E2	Monona silt loam, 14 to 20 percent slopes, moderately eroded	Farmland of statewide importance
10E3	Monona silt loam, 14 to 20 percent slopes, severely eroded	Farmland of statewide importance
12B	Napier silt loam, 2 to 5 percent slopes	Prime farmland
12C	Napier silt loam, 5 to 9 percent slopes	Farmland of statewide importance
17B	Napier-Kennebec-Nodaway complex, 2 to 5 percent slopes	Prime farmland
22D2	Dow silt loam, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
22D3	Dow silt loam, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
22E3	Dow silt loam, 14 to 20 percent slopes, severely eroded	Farmland of statewide importance
26	Kennebec silty clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
35D2	Liston-Burchard complex, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
35E2	Liston-Burchard complex, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland where drained
54+	Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	Prime farmland where drained
59D2	Burchard clay loam, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
59E2	Burchard clay loam, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
99C2	Exira silty clay loam, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
99D2	Exira silty clay loam, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
99E2	Exira silty clay loam, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
100B	Monona silty clay loam, 2 to 5 percent slopes	Prime farmland
100C2	Monona silty clay loam, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
100D2	Monona silty clay loam, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
100D3	Monona silty clay loam, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance

Prime Farmland and Other Important Farmlands--Continued

Map symbol	Map unit name	Farmland classification
100E2	Monona silty clay loam, 14 to 20 percent slopes, moderately eroded	Farmland of statewide importance
100E3	Monona silty clay loam, 14 to 20 percent slopes, severely eroded	Farmland of statewide importance
111D3	Dow-Monona complex, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
111E3	Dow-Monona complex, 14 to 20 percent slopes, severely eroded	Farmland of statewide importance
125D3	Ida-Chute complex, 9 to 14 percent slopes, severely eroded	Farmland of statewide importance
125E3	Ida-Chute complex, 14 to 20 percent slopes, severely eroded	Farmland of statewide importance
133	Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland where drained
133+	Colo silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	Prime farmland where drained
212	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
212+	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	Prime farmland
220	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
266	Smithland silty clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
266+	Smithland silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	Prime farmland
268D	Knox silt loam, 9 to 14 percent slopes	Farmland of statewide importance
268E	Knox silt loam, 14 to 20 percent slopes	Farmland of statewide importance
430	Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
431B	Judson-Ackmore-Colo, overwash, complex, 2 to 5 percent slopes	Prime farmland where drained
509B	Marshall silty clay loam, terrace, 2 to 5 percent slopes	Prime farmland
509C	Marshall silty clay loam, terrace, 5 to 9 percent slopes	Farmland of statewide importance
509C2	Marshall silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
509D2	Marshall silty clay loam, terrace, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
509E2	Marshall silty clay loam, terrace, 14 to 20 percent slopes, moderately eroded	Farmland of statewide importance
510	Monona silt loam, terrace, 0 to 2 percent slopes	Prime farmland
510B	Monona silt loam, terrace, 2 to 5 percent slopes	Prime farmland
510C2	Monona silt loam, terrace, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
510D2	Monona silt loam, terrace, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
510E2	Monona silt loam, terrace, 14 to 20 percent slopes, moderately eroded	Farmland of statewide importance
630	Danbury silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
670	Rawles silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
700	Monona silty clay loam, terrace, 0 to 2 percent slopes	Prime farmland
700B	Monona silty clay loam, terrace, 2 to 5 percent slopes	Prime farmland
700C2	Monona silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
700D2	Monona silty clay loam, terrace, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
740D	Hawick gravelly sandy loam, 9 to 14 percent slopes	Farmland of statewide importance
980C	Judson-Gullied land complex, 5 to 9 percent slopes	Farmland of statewide importance

Agricultural Waste Management

The table “Agricultural Waste Management” is described in this section.

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

This table shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of this table, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the table are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a

cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

A soil feature considered in the ratings for application of manure, sewage sludge, and wastewater is depth to the top of a water table (saturated zone). During August, September, and October, this depth is generally more than 60 cm in normal years. For soils that are limited by wetness, “Nov-Jul” indicates the most problematic months of the year for application of manure, sewage sludge, and wastewater. These soils may be slow to drain and can become waterlogged and boggy during periods of heavy precipitation.

Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
1C:							
Ida-----------------	95	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
1C3:							
Ida, severely eroded	80	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
1D3:							
Ida, severely eroded	80	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
1E3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
1F3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
						Too steep for surface application	1.00
8B:							
Judson--------------	80	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.08

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
8C:							
Judson	95	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
9:							
Marshall	95	Not limited		Not limited		Not limited	
9B:							
Marshall	100	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.08
9B2:							
Marshall, moderately eroded	85	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.08
9C:							
Marshall	90	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
9C2:							
Marshall, moderately eroded	80	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
9D:							
Marshall	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9D2:							
Marshall, moderately eroded	70	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
9E2:							
Marshall, moderately eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
9E3:							
Marshall, severely eroded	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
10B:							
Monona	100	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.08
10B2:							
Monona, moderately eroded	80	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.08
10C2:							
Monona, moderately eroded	75	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
10D2:							
Monona, moderately eroded	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
10D3:							
Monona, severely eroded	95	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
10E2:							
Monona, moderately eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
10E3:							
Monona, severely eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
10F2:							
Monona, moderately eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
						Too steep for surface application	1.00
10F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
						Too steep for surface application	1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
12B:							
Napier	85	Very limited		Very limited		Very limited	
		Low adsorption	1.00	Low adsorption	1.00	Low adsorption	1.00
						Too steep for surface application	0.08
12C:							
Napier	95	Very limited		Very limited		Very limited	
		Low adsorption	1.00	Low adsorption	1.00	Low adsorption	1.00
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
17B:							
Napier	50	Very limited		Very limited		Very limited	
		Low adsorption	1.00	Low adsorption	1.00	Low adsorption	1.00
						Too steep for surface application	0.08
Kennebec, frequently flooded	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
						Too steep for surface application	0.08
Nodaway, frequently flooded	15	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
						Too steep for surface application	0.08
22D2:							
Dow, moderately eroded	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
22D3:							
Dow, severely eroded	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
22E3:							
Dow, severely eroded	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
26:							
Kennebec, occasionally flooded------------	95	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Too acid	0.01	Too acid	0.01	Too acid	0.01
35D2:							
Liston, moderately eroded-------------	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	0.78
						Slow water movement	0.22
Burchard, moderately eroded-------------	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
		Slow water movement	0.41	Slow water movement	0.31	Too steep for sprinkler application	0.78
						Slow water movement	0.31
35E2:							
Liston, moderately eroded-------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for sprinkler application	1.00
						Slow water movement	0.22

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
35E2:							
Burchard, moderately eroded	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Slow water movement	0.41	Slow water movement	0.31	Too steep for sprinkler application	1.00
						Slow water movement	0.31
35F2:							
Liston, moderately eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
						Slow water movement	0.22
Burchard, moderately eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
		Slow water movement	0.41	Slow water movement	0.31	Too steep for surface application	1.00
						Slow water movement	0.31
35G:							
Liston	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
		Slow water movement	0.30	Slow water movement	0.22	Too steep for surface application	1.00
						Slow water movement	0.22
Burchard	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
		Slow water movement	0.41	Slow water movement	0.31	Too steep for surface application	1.00
						Slow water movement	0.31

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
54:							
Zook, occasionally flooded-----------	90	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Flooding	1.00	Slow water movement	1.00
		Flooding	0.60	Slow water movement	1.00	Flooding	0.60
54+:							
Zook, overwash, occasionally flooded-----------	90	Very limited		Very limited		Very limited	
		Slow water movement	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Flooding	1.00	Slow water movement	1.00
		Flooding	0.60	Slow water movement	1.00	Flooding	0.60
59D2:							
Burchard, moderately eroded------------	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
		Slow water movement	0.41	Slow water movement	0.31	Too steep for sprinkler application	0.78
						Slow water movement	0.31
59E2:							
Burchard, moderately eroded------------	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Slow water movement	0.41	Slow water movement	0.31	Too steep for sprinkler application	1.00
						Slow water movement	0.31
99C2:							
Exira, moderately eroded------------	80	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
99D2:							
Exira, moderately eroded-------------	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
99E2:							
Exira, moderately eroded-------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
100B:							
Monona--------------	75	Not limited		Not limited		Not limited	
100C2:							
Monona, moderately eroded-------------	50	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
100D2:							
Monona, moderately eroded-------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
100D3:							
Monona, severely eroded-------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
100E2:							
Monona, moderately eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
100E3:							
Monona, severely eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
100F2:							
Monona, moderately eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
						Too steep for surface application	1.00
100F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
						Too steep for surface application	1.00
111D3:							
Dow, severely eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
Monona, severely eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
111E3:							
Dow, severely eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
Monona, severely eroded-------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
125D3:							
Ida, severely eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
Chute, severely eroded-------------	30	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
		Leaching	0.45	Droughty	0.21	Too steep for sprinkler application	0.78
125E3:							
Ida, severely eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
Chute, severely eroded-------------	30	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Leaching	0.45	Droughty	0.21	Too steep for sprinkler application	1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
133:							
Colo, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Leaching	0.70	Flooding	1.00	Flooding	0.60
		Flooding	0.60				
133+:							
Colo, overwash, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Leaching	0.70	Flooding	1.00	Flooding	0.60
		Flooding	0.60				
212:							
Kennebec, occasionally flooded-----------	70	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
212+:							
Kennebec, overwash, occasionally flooded-----------	90	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
220:							
Nodaway, occasionally flooded-----------	75	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
266:							
Smithland, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Leaching	0.70	Flooding	1.00	Flooding	0.60
		Flooding	0.60				
266+:							
Smithland, overwash, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Leaching	0.70	Flooding	1.00	Flooding	0.60
		Flooding	0.60				

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
268D:							
Knox	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
268E:							
Knox	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
268F:							
Knox	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for sprinkler application	1.00
						Too steep for surface application	1.00
430:							
Ackmore, occasionally flooded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Slow water movement	0.41	Slow water movement	0.31	Slow water movement	0.31
431B:							
Judson	55	Not limited		Not limited		Not limited	
Ackmore, frequently flooded	25	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Colo, overwash, frequently flooded	15	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Leaching	0.70				
509B:							
Marshall, terrace	90	Not limited		Not limited		Not limited	

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
509C:							
Marshall, terrace---	85	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
509C2:							
Marshall, terrace, moderately eroded--	65	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
509D2:							
Marshall, terrace, moderately eroded--	65	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
509E2:							
Marshall, terrace, moderately eroded--	65	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
510:							
Monona, terrace-----	100	Not limited		Not limited		Not limited	
510B:							
Monona, terrace-----	60	Not limited		Not limited		Not limited	
510C2:							
Monona, terrace, moderately eroded--	75	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
510D2:							
Monona, terrace, moderately eroded--	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
510E2:							
Monona, terrace, moderately eroded--	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
630:							
Danbury, occasionally flooded------------	80	Very limited		Very limited		Very limited	
		Depth to saturated zone (Nov-Jul)	1.00	Flooding	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Flooding	0.60	Depth to saturated zone (Nov-Jul)	1.00	Flooding	0.60
		Slow water movement	0.41	Slow water movement	0.31	Slow water movement	0.31
670:							
Rawles, occasionally flooded------------	80	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
700:							
Monona, terrace-----	100	Not limited		Not limited		Not limited	
700B:							
Monona, terrace-----	75	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.08
700C2:							
Monona, terrace, moderately eroded--	50	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
700D2:							
Monona, terrace, moderately eroded--	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
717D:							
Napier--------------	50	Very limited		Very limited		Very limited	
		Low adsorption	1.00	Low adsorption	1.00	Low adsorption	1.00
		Slope	0.04	Slope	0.04	Too steep for surface application	1.00
						Too steep for sprinkler application	0.22
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
740D:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Droughty	0.91	Droughty	0.91	Too steep for surface application	1.00
		Slope	0.63	Slope	0.63	Droughty	0.91
740E:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Droughty	0.91	Droughty	0.91	Too steep for sprinkler application	1.00
740F:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Filtering capacity	1.00	Slope	1.00	Too steep for sprinkler application	1.00
		Droughty	0.91	Droughty	0.91	Too steep for surface application	1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
980C:							
Judson--------------	55	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
1220:							
Nodaway, channeled, frequently flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
5010:							
Pits, sand and gravel-------------	100	Not rated		Not rated		Not rated	
5040:							
Udorthents----------	100	Not rated		Not rated		Not rated	
5080:							
Udorthents----------	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon-------	100	Not rated		Not rated		Not rated	
W:							
Water---------------	100	Not rated		Not rated		Not rated	

Recreational Development

The titles of the tables described in this section are:

- “Camp Areas, Picnic Areas, and Playgrounds”
- “Paths, Trails, and Golf Fairways”

In the tables described in this section, the soils of the survey area are rated according to limitations that affect their suitability for recreational development. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in these tables can be supplemented by other information in this survey, for example, interpretations for dwellings without basements, for local roads and streets, and for septic tank absorption fields.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the

surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Camp Areas, Picnic Areas, and Playgrounds

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1C:							
Ida	95	Not limited		Not limited		Very limited	
						Slope	1.00
1C3:							
Ida, severely eroded	80	Not limited		Not limited		Very limited	
						Slope	1.00
1D3:							
Ida, severely eroded	80	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
1E3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
1F3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
8B:							
Judson	80	Not limited		Not limited		Somewhat limited	
						Slope	0.50
8C:							
Judson	95	Not limited		Not limited		Very limited	
						Slope	1.00
9:							
Marshall	95	Not limited		Not limited		Not limited	
9B:							
Marshall	100	Not limited		Not limited		Somewhat limited	
						Slope	0.50
9B2:							
Marshall, moderately eroded	85	Not limited		Not limited		Somewhat limited	
						Slope	0.50
9C:							
Marshall	90	Not limited		Not limited		Very limited	
						Slope	1.00
9C2:							
Marshall, moderately eroded	80	Not limited		Not limited		Very limited	
						Slope	1.00
9D:							
Marshall	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9D2:							
Marshall, moderately eroded	70	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
9E2:							
Marshall, moderately eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
9E3:							
Marshall, severely eroded	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10B:							
Monona	100	Not limited		Not limited		Somewhat limited	
						Slope	0.50
10B2:							
Monona, moderately eroded	80	Not limited		Not limited		Somewhat limited	
						Slope	0.50
10C2:							
Monona, moderately eroded	75	Not limited		Not limited		Very limited	
						Slope	1.00
10D2:							
Monona, moderately eroded	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
10D3:							
Monona, severely eroded	95	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
10E2:							
Monona, moderately eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10E3:							
Monona, severely eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10F2:							
Monona, moderately eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
12B:							
Napier	85	Not limited		Not limited		Somewhat limited	
						Slope	0.50
12C:							
Napier	95	Not limited		Not limited		Very limited	
						Slope	1.00
17B:							
Napier	50	Not limited		Not limited		Somewhat limited	
						Slope	0.50
Kennebec, frequently flooded	20	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
						Slope	0.50
Nodaway, frequently flooded	15	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
						Slope	0.50
22D2:							
Dow, moderately eroded	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
22D3:							
Dow, severely eroded	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
22E3:							
Dow, severely eroded	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
26:							
Kennebec, occasionally flooded	95	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
35D2:							
Liston, moderately eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Burchard, moderately eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
35E2:							
Liston, moderately eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Burchard, moderately eroded	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21
35F2:							
Liston, moderately eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Burchard, moderately eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21
35G:							
Liston	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
Burchard	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.94	Slow water movement	0.94
		Slow water movement	0.94			Flooding	0.60
54+:							
Zook, overwash, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.94	Slow water movement	0.94
		Slow water movement	0.94			Flooding	0.60

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
59D2:							
Burchard, moderately eroded------------	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21
59E2:							
Burchard, moderately eroded------------	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21
99C2:							
Exira, moderately eroded------------	80	Not limited		Not limited		Very limited	
						Slope	1.00
99D2:							
Exira, moderately eroded------------	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
99E2:							
Exira, moderately eroded------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
100B:							
Monona-------------	75	Not limited		Not limited		Somewhat limited	
						Slope	0.12
100C2:							
Monona, moderately eroded------------	50	Not limited		Not limited		Very limited	
						Slope	1.00
100D2:							
Monona, moderately eroded------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
100D3:							
Monona, severely eroded------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
100E2:							
Monona, moderately eroded------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
100E3:							
Monona, severely eroded------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
100F2:							
Monona, moderately eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
100F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
111D3:							
Dow, severely eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Monona, severely eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
111E3:							
Dow, severely eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Monona, severely eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
125D3:							
Ida, severely eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Chute, severely eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.76	Too sandy	0.76	Slope	1.00
		Slope	0.63	Slope	0.63	Too sandy	0.76
125E3:							
Ida, severely eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Chute, severely eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too sandy	0.76	Too sandy	0.76	Too sandy	0.76
133:							
Colo, occasionally flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00			Flooding	0.60
133+:							
Colo, overwash, occasionally flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00			Flooding	0.60

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
212:							
Kennebec, occasionally flooded-----------	70	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
212+:							
Kennebec, overwash, occasionally flooded-----------	90	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
220:							
Nodaway, occasionally flooded-----------	75	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
266:							
Smithland, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00			Flooding	0.60
266+:							
Smithland, overwash, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00			Flooding	0.60
268D:							
Knox----------------	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
268E:							
Knox----------------	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
268F:							
Knox----------------	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
430:							
Ackmore, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slow water movement	0.21	Flooding	0.60
		Slow water movement	0.21			Slow water movement	0.21
431B:							
Judson--------------	55	Not limited		Not limited		Somewhat limited	
						Slope	0.12

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
431B:							
Ackmore, frequently flooded-----------	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.40	Flooding	1.00
						Slope	0.12
Colo, overwash, frequently flooded	15	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.40	Flooding	1.00
						Slope	0.12
509B:							
Marshall, terrace---	90	Not limited		Not limited		Somewhat limited	
						Slope	0.12
509C:							
Marshall, terrace---	85	Not limited		Not limited		Very limited	
						Slope	1.00
509C2:							
Marshall, terrace, moderately eroded--	65	Not limited		Not limited		Very limited	
						Slope	1.00
509D2:							
Marshall, terrace, moderately eroded--	65	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
509E2:							
Marshall, terrace, moderately eroded--	65	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
510:							
Monona, terrace-----	100	Not limited		Not limited		Not limited	
510B:							
Monona, terrace-----	60	Not limited		Not limited		Somewhat limited	
						Slope	0.12
510C2:							
Monona, terrace, moderately eroded--	75	Not limited		Not limited		Very limited	
						Slope	1.00
510D2:							
Monona, terrace, moderately eroded--	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
510E2:							
Monona, terrace, moderately eroded--	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
630:							
Danbury, occasionally flooded	80	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Slow water movement	0.21	Flooding	0.60
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Depth to saturated zone	0.39
		Slow water movement	0.21			Slow water movement	0.21
670:							
Rawles, occasionally flooded	80	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
700:							
Monona, terrace	100	Not limited		Not limited		Not limited	
700B:							
Monona, terrace	75	Not limited		Not limited		Somewhat limited	
						Slope	0.50
700C2:							
Monona, terrace, moderately eroded	50	Not limited		Not limited		Very limited	
						Slope	1.00
700D2:							
Monona, terrace, moderately eroded	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
717D:							
Napier	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
740D:							
Hawick	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Too sandy	1.00
						Gravel content	0.90
740E:							
Hawick	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Too sandy	1.00
						Gravel content	0.90
740F:							
Hawick	90	Very limited		Very limited		Very limited	
		Slope	1.00	Too sandy	1.00	Slope	1.00
		Too sandy	1.00	Slope	1.00	Too sandy	1.00
						Gravel content	0.90

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
980C:							
Judson	55	Not limited		Not limited		Very limited	
						Slope	1.00
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
1220:							
Nodaway, channeled, frequently flooded	80	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
5010:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
5040:							
Udorthents	100	Not rated		Not rated		Not rated	
5080:							
Udorthents	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Paths, Trails, and Golf Fairways

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1C:							
Ida	95	Not limited		Not limited		Not limited	
1C3:							
Ida, severely eroded	80	Not limited		Not limited		Not limited	
1D3:							
Ida, severely eroded	80	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
1E3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.08				
1F3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	1.00				
8B:							
Judson	80	Not limited		Not limited		Not limited	
8C:							
Judson	95	Not limited		Not limited		Not limited	
9:							
Marshall	95	Not limited		Not limited		Not limited	
9B:							
Marshall	100	Not limited		Not limited		Not limited	
9B2:							
Marshall, moderately eroded	85	Not limited		Not limited		Not limited	
9C:							
Marshall	90	Not limited		Not limited		Not limited	
9C2:							
Marshall, moderately eroded	80	Not limited		Not limited		Not limited	
9D:							
Marshall	85	Not limited		Not limited		Somewhat limited	
						Slope	0.63
9D2:							
Marshall, moderately eroded	70	Not limited		Not limited		Somewhat limited	
						Slope	0.63

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
9E2:							
Marshall, moderately eroded	70	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Slope	1.00
9E3:							
Marshall, severely eroded	75	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Slope	1.00
10B:							
Monona	100	Not limited		Not limited		Not limited	
10B2:							
Monona, moderately eroded	80	Not limited		Not limited		Not limited	
10C2:							
Monona, moderately eroded	75	Not limited		Not limited		Not limited	
10D2:							
Monona, moderately eroded	60	Not limited		Not limited		Somewhat limited	
						Slope	0.63
10D3:							
Monona, severely eroded	95	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
10E2:							
Monona, moderately eroded	50	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
10E3:							
Monona, severely eroded	60	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.08				
10F2:							
Monona, moderately eroded	45	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
10F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	1.00				
12B:							
Napier	85	Not limited		Not limited		Not limited	
12C:							
Napier	95	Not limited		Not limited		Not limited	

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
17B:							
Napier	50	Not limited		Not limited		Not limited	
Kennebec, frequently flooded	20	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
Nodaway, frequently flooded	15	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
22D2:							
Dow, moderately eroded	90	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
22D3:							
Dow, severely eroded	90	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
22E3:							
Dow, severely eroded	80	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.08				
26:							
Kennebec, occasionally flooded	95	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
35D2:							
Liston, moderately eroded	50	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Burchard, moderately eroded	35	Not limited		Not limited		Somewhat limited	
						Slope	0.63
35E2:							
Liston, moderately eroded	50	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Slope	1.00
Burchard, moderately eroded	35	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Slope	1.00
35F2:							
Liston, moderately eroded	40	Somewhat limited		Not limited		Very limited	
		Slope	0.68			Slope	1.00
Burchard, moderately eroded	30	Somewhat limited		Not limited		Very limited	
		Slope	0.68			Slope	1.00

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Paths and trails: Value	Off-road motorcycle trails: Rating class and limiting features	Off-road motorcycle trails: Value	Golf fairways: Rating class and limiting features	Golf fairways: Value
35G:							
Liston	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.56	Slope	1.00
Burchard	35	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.56	Slope	1.00
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
54+:							
Zook, overwash, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
59D2:							
Burchard, moderately eroded	55	Not limited		Not limited		Somewhat limited	
						Slope	0.63
59E2:							
Burchard, moderately eroded	55	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Slope	1.00
99C2:							
Exira, moderately eroded	80	Not limited		Not limited		Not limited	
99D2:							
Exira, moderately eroded	50	Not limited		Not limited		Somewhat limited	
						Slope	0.63
99E2:							
Exira, moderately eroded	45	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Slope	1.00
100B:							
Monona	75	Not limited		Not limited		Not limited	
100C2:							
Monona, moderately eroded	50	Not limited		Not limited		Not limited	
100D2:							
Monona, moderately eroded	45	Not limited		Not limited		Somewhat limited	
						Slope	0.63

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
100D3:							
Monona, severely eroded	45	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
100E2:							
Monona, moderately eroded	45	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
100E3:							
Monona, severely eroded	45	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
100F2:							
Monona, moderately eroded	55	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
100F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	1.00				
111D3:							
Dow, severely eroded	55	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Monona, severely eroded	40	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
111E3:							
Dow, severely eroded	55	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.08				
Monona, severely eroded	40	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.08				
125D3:							
Ida, severely eroded	50	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.63
Chute, severely eroded	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.76	Too sandy	0.76	Slope	0.63
						Droughty	0.22
125E3:							
Ida, severely eroded	50	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.08				

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
125E3:							
Chute, severely eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.76	Too sandy	0.76	Slope	1.00
		Slope	0.08			Droughty	0.22
133:							
Colo, occasionally flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
133+:							
Colo, overwash, occasionally flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
212:							
Kennebec, occasionally flooded	70	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
212+:							
Kennebec, overwash, occasionally flooded	90	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
220:							
Nodaway, occasionally flooded	75	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
266:							
Smithland, occasionally flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
266+:							
Smithland, overwash, occasionally flooded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
268D:							
Knox	85	Not limited		Not limited		Somewhat limited	
						Slope	0.63

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
268E:							
Knox	80	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
268F:							
Knox	75	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
430:							
Ackmore, occasionally flooded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
431B:							
Judson	55	Not limited		Not limited		Not limited	
Ackmore, frequently flooded	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
Colo, overwash, frequently flooded	15	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
509B:							
Marshall, terrace	90	Not limited		Not limited		Not limited	
509C:							
Marshall, terrace	85	Not limited		Not limited		Not limited	
509C2:							
Marshall, terrace, moderately eroded	65	Not limited		Not limited		Not limited	
509D2:							
Marshall, terrace, moderately eroded	65	Not limited		Not limited		Somewhat limited	
						Slope	0.63
509E2:							
Marshall, terrace, moderately eroded	65	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
510:							
Monona, terrace	100	Not limited		Not limited		Not limited	
510B:							
Monona, terrace	60	Not limited		Not limited		Not limited	

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
510C2:							
Monona, terrace, moderately eroded--	75	Not limited		Not limited		Not limited	
510D2:							
Monona, terrace, moderately eroded--	75	Not limited		Not limited		Somewhat limited	
						Slope	0.63
510E2:							
Monona, terrace, moderately eroded--	75	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
630:							
Danbury, occasionally flooded-----------	80	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
						Depth to saturated zone	0.19
670:							
Rawles, occasionally flooded-----------	80	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
700:							
Monona, terrace-----	100	Not limited		Not limited		Not limited	
700B:							
Monona, terrace-----	75	Not limited		Not limited		Not limited	
700C2:							
Monona, terrace, moderately eroded--	50	Not limited		Not limited		Not limited	
700D2:							
Monona, terrace, moderately eroded--	60	Not limited		Not limited		Somewhat limited	
						Slope	0.63
717D:							
Napier--------------	50	Not limited		Not limited		Somewhat limited	
						Slope	0.04
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
740D:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.99
						Slope	0.63
740E:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Slope	1.00
		Slope	0.02			Droughty	0.99

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Paths and trails: Value	Off-road motorcycle trails: Rating class and limiting features	Off-road motorcycle trails: Value	Golf fairways: Rating class and limiting features	Golf fairways: Value
740F:							
Hawick	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Slope	1.00
		Slope	0.82			Droughty	0.99
980C:							
Judson	55	Not limited		Not limited		Not limited	
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
1220:							
Nodaway, channeled, frequently flooded	80	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
5010:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
5040:							
Udorthents	100	Not rated		Not rated		Not rated	
5080:							
Udorthents	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, reclamation material, roadfill, and topsoil; plan structures for water management; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

The titles of the tables described in this section are:

- “Dwellings and Small Commercial Buildings”
- “Roads and Streets, Shallow Excavations, and Lawns and Landscaping”

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The tables described in this section show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1C:							
Ida-----------------	95	Not limited		Not limited		Somewhat limited	
						Slope	0.88
1C3:							
Ida, severely eroded	80	Not limited		Not limited		Somewhat limited	
						Slope	0.88
1D3:							
Ida, severely eroded	80	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
1E3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
1F3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
8B:							
Judson--------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
8C:							
Judson--------------	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
9:							
Marshall------------	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
9B:							
Marshall------------	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
9B2:							
Marshall, moderately eroded------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
9C:							
Marshall------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
9C2:							
Marshall, moderately eroded------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
9D:							
Marshall------------	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
9D2:							
Marshall, moderately eroded------------	70	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
9E2:							
Marshall, moderately eroded------------	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
9E3:							
Marshall, severely eroded------------	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
10B:							
Monona--------------	100	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
10B2:							
Monona, moderately eroded------------	80	Not limited		Not limited		Not limited	
10C2:							
Monona, moderately eroded------------	75	Not limited		Not limited		Somewhat limited	
						Slope	0.88
10D2:							
Monona, moderately eroded------------	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
10D3:							
Monona, severely eroded------------	95	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
10E2:							
Monona, moderately eroded------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10E3:							
Monona, severely eroded------------	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
10F2:							
Monona, moderately eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
12B:							
Napier	85	Not limited		Not limited		Not limited	
12C:							
Napier	95	Not limited		Not limited		Somewhat limited	
						Slope	0.88
17B:							
Napier	50	Not limited		Not limited		Not limited	
Kennebec, frequently flooded	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
Nodaway, frequently flooded	15	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
22D2:							
Dow, moderately eroded	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
22D3:							
Dow, severely eroded	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
22E3:							
Dow, severely eroded	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
26:							
Kennebec, occasionally flooded	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.61		

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
35D2:							
Liston, moderately eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Burchard, moderately eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
35E2:							
Liston, moderately eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Burchard, moderately eroded	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
35F2:							
Liston, moderately eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Burchard, moderately eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
35G:							
Liston	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Burchard	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
54+:							
Zook, overwash, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
59D2:							
Burchard, moderately eroded-------------	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
59E2:							
Burchard, moderately eroded-------------	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
99C2:							
Exira, moderately eroded-------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
99D2:							
Exira, moderately eroded-------------	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
99E2:							
Exira, moderately eroded-------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
100B:							
Monona--------------	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
100C2:							
Monona, moderately eroded-------------	50	Not limited		Not limited		Somewhat limited	
						Slope	0.88
100D2:							
Monona, moderately eroded-------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
100D3:							
Monona, severely eroded-------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50			Shrink-swell	0.50
100E2:							
Monona, moderately eroded-------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
100E3:							
Monona, severely eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50			Shrink-swell	0.50
100F2:							
Monona, moderately eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
100F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50			Shrink-swell	0.50
111D3:							
Dow, severely eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Monona, severely eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
111E3:							
Dow, severely eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Monona, severely eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
125D3:							
Ida, severely eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Chute, severely eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
125E3:							
Ida, severely eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Chute, severely eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
133:							
Colo, occasionally flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
133+:							
Colo, overwash, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
212:							
Kennebec, occasionally flooded-----------	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
212+:							
Kennebec, overwash, occasionally flooded-----------	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
220:							
Nodaway, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
266:							
Smithland, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
266+:							
Smithland, overwash, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
268D:							
Knox----------------	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
268E:							
Knox----------------	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
268F:							
Knox----------------	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
430:							
Ackmore, occasionally flooded------------	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	1.00	Shrink-swell	0.50
431B:							
Judson--------------	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Ackmore, frequently flooded------------	25	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	1.00	Shrink-swell	0.50
Colo, overwash, frequently flooded	15	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
509B:							
Marshall, terrace---	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
509C:							
Marshall, terrace---	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
509C2:							
Marshall, terrace, moderately eroded--	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
509D2:							
Marshall, terrace, moderately eroded--	65	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
509E2:							
Marshall, terrace, moderately eroded--	65	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
510:							
Monona, terrace-----	100	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
510B:							
Monona, terrace-----	60	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
510C2:							
Monona, terrace, moderately eroded--	75	Not limited		Not limited		Somewhat limited	
						Slope	0.88
510D2:							
Monona, terrace, moderately eroded--	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
510E2:							
Monona, terrace, moderately eroded--	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
630:							
Danbury, occasionally flooded-----------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	1.00	Shrink-swell	0.50
		Depth to saturated zone	0.39	Shrink-swell	1.00	Depth to saturated zone	0.39
670:							
Rawles, occasionally flooded-----------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
700:							
Monona, terrace-----	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
700B:							
Monona, terrace-----	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
700C2:							
Monona, terrace, moderately eroded	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
700D2:							
Monona, terrace, moderately eroded	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
717D:							
Napier	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
740D:							
Hawick	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
740E:							
Hawick	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
740F:							
Hawick	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
980C:							
Judson	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
1220:							
Nodaway, channeled, frequently flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
5010:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
5040:							
Udorthents	100	Not rated		Not rated		Not rated	
5080:							
Udorthents	100	Not rated		Not rated		Not rated	

Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon-------	100	Not rated		Not rated		Not rated	
W:							
Water---------------	100	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1C:							
Ida	95	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
1C3:							
Ida, severely eroded	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
1D3:							
Ida, severely eroded	80	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
1E3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
1F3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
8B:							
Judson	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
8C:							
Judson	95	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
9:							
Marshall	95	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
9B:							
Marshall	100	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
9B2:							
Marshall, moderately eroded	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9C:							
Marshall	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
9C2:							
Marshall, moderately eroded	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
9D:							
Marshall	85	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
		Shrink-swell	0.50				
9D2:							
Marshall, moderately eroded	70	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.63				
9E2:							
Marshall, moderately eroded	70	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	1.00				
9E3:							
Marshall, severely eroded	75	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	1.00				
10B:							
Monona	100	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
10B2:							
Monona, moderately eroded	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
10C2:							
Monona, moderately eroded	75	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
10D2:							
Monona, moderately eroded	60	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
10D3:							
Monona, severely eroded	95	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
10E2:							
Monona, moderately eroded	50	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
10E3:							
Monona, severely eroded	60	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
10F2:							
Monona, moderately eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
10F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
12B:							
Napier	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
12C:							
Napier	95	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
17B:							
Napier	50	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
Kennebec, frequently flooded	20	Very limited		Somewhat limited		Very limited	
		Frost action	1.00	Flooding	0.80	Flooding	1.00
		Flooding	1.00	Depth to saturated zone	0.61		
		Shrink-swell	0.50	Cutbanks cave	0.10		
Nodaway, frequently flooded	15	Very limited		Somewhat limited		Very limited	
		Frost action	1.00	Flooding	0.80	Flooding	1.00
		Flooding	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Cutbanks cave	0.10		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
22D2:							
Dow, moderately eroded	90	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
22D3:							
Dow, severely eroded	90	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
22E3:							
Dow, severely eroded	80	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
26:							
Kennebec, occasionally flooded	95	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
				Cutbanks cave	0.10		
35D2:							
Liston, moderately eroded	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
Burchard, moderately eroded	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
35E2:							
Liston, moderately eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
Burchard, moderately eroded	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
35F2:							
Liston, moderately eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
35F2:							
Burchard, moderately eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
35G:							
Liston	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
Burchard	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
54+:							
Zook, overwash, occasionally flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
59D2:							
Burchard, moderately eroded	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
59E2:							
Burchard, moderately eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
99C2:							
Exira, moderately eroded	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99D2:							
Exira, moderately eroded-------------	50	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.63				
99E2:							
Exira, moderately eroded-------------	45	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	1.00				
100B:							
Monona--------------	75	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
100C2:							
Monona, moderately eroded-------------	50	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
100D2:							
Monona, moderately eroded-------------	45	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.63				
100D3:							
Monona, severely eroded-------------	45	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.63				
100E2:							
Monona, moderately eroded-------------	45	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	1.00				
100E3:							
Monona, severely eroded-------------	45	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	1.00				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
100F2:							
Monona, moderately eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
100F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
111D3:							
Dow, severely eroded	55	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
Monona, severely eroded	40	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
111E3:							
Dow, severely eroded	55	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
Monona, severely eroded	40	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
125D3:							
Ida, severely eroded	50	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
Chute, severely eroded	30	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Cutbanks cave	1.00	Slope	0.63
				Slope	0.63	Droughty	0.22
125E3:							
Ida, severely eroded	50	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
Chute, severely eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
				Slope	1.00	Droughty	0.22

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
133:							
Colo, occasionally flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
133+:							
Colo, overwash, occasionally flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
212:							
Kennebec, occasionally flooded	70	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Low strength	1.00	Cutbanks cave	0.10		
212+:							
Kennebec, overwash, occasionally flooded	90	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Shrink-swell	0.50	Cutbanks cave	0.10		
220:							
Nodaway, occasionally flooded	75	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Low strength	1.00	Cutbanks cave	0.10		
266:							
Smithland, occasionally flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
266+:							
Smithland, overwash, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
268D:							
Knox----------------	85	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
		Shrink-swell	0.50				
268E:							
Knox----------------	80	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
268F:							
Knox----------------	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
430:							
Ackmore, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
431B:							
Judson--------------	55	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
Ackmore, frequently flooded-----------	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Flooding	1.00	Cutbanks cave	0.10		
Colo, overwash, frequently flooded	15	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Flooding	1.00	Cutbanks cave	0.10		
509B:							
Marshall, terrace---	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
509C:							
Marshall, terrace---	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
509C2:							
Marshall, terrace, moderately eroded--	65	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
509D2:							
Marshall, terrace, moderately eroded--	65	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.63				
509E2:							
Marshall, terrace, moderately eroded--	65	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	1.00				
510:							
Monona, terrace-----	100	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
510B:							
Monona, terrace-----	60	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
510C2:							
Monona, terrace, moderately eroded--	75	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
510D2:							
Monona, terrace, moderately eroded--	75	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
510E2:							
Monona, terrace, moderately eroded--	75	Very limited		Very limited		Very limited	
		Frost action	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
630:							
Danbury, occasionally flooded-----------	80	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Flooding	1.00	Flooding	0.60	Depth to saturated zone	0.19
		Shrink-swell	0.50	Cutbanks cave	0.10		
670:							
Rawles, occasionally flooded-----------	80	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Shrink-swell	0.50	Cutbanks cave	0.10		
700:							
Monona, terrace-----	100	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
700B:							
Monona, terrace-----	75	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
700C2:							
Monona, terrace, moderately eroded--	50	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
700D2:							
Monona, terrace, moderately eroded--	60	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
		Shrink-swell	0.50				
717D:							
Napier--------------	50	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Cutbanks cave	0.10	Slope	0.04
		Slope	0.04	Slope	0.04		
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
740D:							
Hawick--------------	90	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Cutbanks cave	1.00	Droughty	0.99
				Slope	0.63	Slope	0.63
740E:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
				Slope	1.00	Droughty	0.99

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
740F:							
Hawick	90	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
				Slope	1.00	Droughty	0.99
980C:							
Judson	55	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
1220:							
Nodaway, channeled, frequently flooded	80	Very limited		Somewhat limited		Very limited	
		Frost action	1.00	Flooding	0.80	Flooding	1.00
		Flooding	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Cutbanks cave	0.10		
5010:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
5040:							
Udorthents	100	Not rated		Not rated		Not rated	
5080:							
Udorthents	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Sanitary Facilities

The titles of the tables described in this section are:

- “Sewage Disposal”
- “Landfills”

These tables show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If

the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1C:					
Ida-----------------	95	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
1C3:					
Ida, severely eroded	80	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
1D3:					
Ida, severely eroded	80	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
1E3:					
Ida, severely eroded	70	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
1F3:					
Ida, severely eroded	70	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
8B:					
Judson--------------	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.32
8C:					
Judson--------------	95	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
9:					
Marshall------------	95	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
9B:					
Marshall------------	100	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.32

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
9B2:					
Marshall, moderately eroded	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.32
9C:					
Marshall	90	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
9C2:					
Marshall, moderately eroded	80	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
9D:					
Marshall	85	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
9D2:					
Marshall, moderately eroded	70	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
9E2:					
Marshall, moderately eroded	70	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
9E3:					
Marshall, severely eroded	75	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
10B:					
Monona	100	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.32
10B2:					
Monona, moderately eroded	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.32

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
10C2:					
Monona, moderately eroded------------	75	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
10D2:					
Monona, moderately eroded------------	60	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
10D3:					
Monona, severely eroded------------	95	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
10E2:					
Monona, moderately eroded------------	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
10E3:					
Monona, severely eroded------------	60	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
10F2:					
Monona, moderately eroded------------	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
10F3:					
Monona, severely eroded------------	70	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
12B:					
Napier--------------	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.32
12C:					
Napier--------------	95	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
17B:					
Napier--------------	50	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.32
Kennebec, frequently flooded------------	20	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
		Slow water movement	0.46	Seepage	0.53
Nodaway, frequently flooded------------	15	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
		Slow water movement	0.50	Seepage	0.50
22D2:					
Dow, moderately eroded-------------	90	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
22D3:					
Dow, severely eroded	90	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
22E3:					
Dow, severely eroded	80	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
26:					
Kennebec, occasionally flooded------------	95	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
35D2:					
Liston, moderately eroded-------------	50	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
35D2:					
Burchard, moderately eroded	35	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
35E2:					
Liston, moderately eroded	50	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
Burchard, moderately eroded	35	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
35F2:					
Liston, moderately eroded	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	1.00		
Burchard, moderately eroded	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	1.00		
35G:					
Liston	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	1.00		
Burchard	35	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	1.00		
54:					
Zook, occasionally flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
54+:					
Zook, overwash, occasionally flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
59D2:					
Burchard, moderately eroded	55	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.63		
59E2:					
Burchard, moderately eroded	55	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
99C2:					
Exira, moderately eroded	80	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
99D2:					
Exira, moderately eroded	50	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
99E2:					
Exira, moderately eroded	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
100B:					
Monona	75	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.08
100C2:					
Monona, moderately eroded	50	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
100D2:					
Monona, moderately eroded	45	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
100D3:					
Monona, severely eroded	45	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
100E2:					
Monona, moderately eroded	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
100E3:					
Monona, severely eroded	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.50	Seepage	0.50
100F2:					
Monona, moderately eroded	55	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
100F3:					
Monona, severely eroded	70	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
111D3:					
Dow, severely eroded	55	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
Monona, severely eroded	40	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
111E3:					
Dow, severely eroded	55	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
111E3:					
Monona, severely eroded	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
125D3:					
Ida, severely eroded	50	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
Chute, severely eroded	30	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slope	0.63		
125E3:					
Ida, severely eroded	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
Chute, severely eroded	30	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slope	1.00		
133:					
Colo, occasionally flooded	85	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.46	Seepage	0.53
133+:					
Colo, overwash, occasionally flooded	85	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.46	Seepage	0.53

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
212:					
Kennebec, occasionally flooded	70	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
		Slow water movement	0.46	Seepage	0.53
212+:					
Kennebec, overwash, occasionally flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
		Slow water movement	0.46	Seepage	0.53
220:					
Nodaway, occasionally flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
		Slow water movement	0.50	Seepage	0.50
266:					
Smithland, occasionally flooded	85	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.46	Seepage	0.53
266+:					
Smithland, overwash, occasionally flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.46	Seepage	0.53
268D:					
Knox	85	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
268E:					
Knox	80	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
268F:					
Knox	75	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
430:					
Ackmore, occasionally flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.53
431B:					
Judson	55	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.08
Ackmore, frequently flooded	25	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.46	Seepage	0.53
Colo, overwash, frequently flooded	15	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.46	Seepage	0.53
509B:					
Marshall, terrace	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.08
509C:					
Marshall, terrace	85	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
509C2:					
Marshall, terrace, moderately eroded	65	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
509D2:					
Marshall, terrace, moderately eroded--	65	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
509E2:					
Marshall, terrace, moderately eroded--	65	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
510:					
Monona, terrace-----	100	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
510B:					
Monona, terrace-----	60	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.08
510C2:					
Monona, terrace, moderately eroded--	75	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
510D2:					
Monona, terrace, moderately eroded--	75	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
510E2:					
Monona, terrace, moderately eroded--	75	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
630:					
Danbury, occasionally flooded-----------	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.53

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
670:					
Rawles, occasionally flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
		Slow water movement	0.46	Seepage	0.53
700:					
Monona, terrace	100	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
700B:					
Monona, terrace	75	Somewhat limited		Somewhat limited	
		Slow water movement	0.46	Seepage	0.53
				Slope	0.32
700C2:					
Monona, terrace, moderately eroded	50	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
700D2:					
Monona, terrace, moderately eroded	60	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.46	Seepage	0.53
717D:					
Napier	50	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
		Slope	0.04		
Gullied land, frequently flooded	35	Not rated		Not rated	
740D:					
Hawick	90	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
				Seepage	1.00
		Seepage, bottom layer	1.00		
		Slope	0.63		
740E:					
Hawick	90	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
				Seepage	1.00
		Seepage, bottom layer	1.00		
		Slope	1.00		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
740F:					
Hawick--------------	90	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Seepage, bottom layer	1.00		
980C:					
Judson--------------	55	Somewhat limited		Very limited	
		Slow water movement	0.46	Slope	1.00
				Seepage	0.53
Gullied land, frequently flooded	35	Not rated		Not rated	
1220:					
Nodaway, channeled, frequently flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
		Slow water movement	0.50	Seepage	0.50
5010:					
Pits, sand and gravel-------------	100	Not rated		Not rated	
5040:					
Udorthents----------	100	Not rated		Not rated	
5080:					
Udorthents----------	100	Not rated		Not rated	
AW:					
Animal waste lagoon	100	Not rated		Not rated	
SL:					
Sewage lagoon-------	100	Not rated		Not rated	
W:					
Water---------------	100	Not rated		Not rated	

Landfills

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1C:							
Ida-----------------	95	Not limited		Not limited		Not limited	
1C3:							
Ida, severely eroded	80	Not limited		Not limited		Not limited	
1D3:							
Ida, severely eroded	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
1E3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
1F3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
8B:							
Judson--------------	80	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
8C:							
Judson--------------	95	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9:							
Marshall------------	95	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9B:							
Marshall------------	100	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9B2:							
Marshall, moderately eroded-------------	85	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9C:							
Marshall------------	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9C2:							
Marshall, moderately eroded-------------	80	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
9D:							
Marshall------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9D2:							
Marshall, moderately eroded	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
9E2:							
Marshall, moderately eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
9E3:							
Marshall, severely eroded	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
10B:							
Monona	100	Not limited		Not limited		Not limited	
10B2:							
Monona, moderately eroded	80	Not limited		Not limited		Not limited	
10C2:							
Monona, moderately eroded	75	Not limited		Not limited		Not limited	
10D2:							
Monona, moderately eroded	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
10D3:							
Monona, severely eroded	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
10E2:							
Monona, moderately eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10E3:							
Monona, severely eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10F2:							
Monona, moderately eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
10F3:							
Monona, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
12B:							
Napier--------------	85	Not limited		Not limited		Not limited	
12C:							
Napier--------------	95	Not limited		Not limited		Not limited	
17B:							
Napier--------------	50	Not limited		Not limited		Not limited	
Kennebec, frequently flooded------------	20	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
Nodaway, frequently flooded------------	15	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too clayey	0.50				
22D2:							
Dow, moderately eroded-------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
22D3:							
Dow, severely eroded	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
22E3:							
Dow, severely eroded	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
26:							
Kennebec, occasionally flooded------------	95	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Seepage, bottom layer	1.00				
35D2:							
Liston, moderately eroded-------------	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Burchard, moderately eroded-------------	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
35E2:							
Liston, moderately eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
Burchard, moderately eroded	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
35F2:							
Liston, moderately eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
Burchard, moderately eroded	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
35G:							
Liston	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
Burchard	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
54:							
Zook, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
54+:							
Zook, overwash, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
59D2:							
Burchard, moderately eroded	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
59E2:							
Burchard, moderately eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99C2:							
Exira, moderately eroded-------------	80	Not limited		Not limited		Somewhat limited	
						Too clayey	0.50
99D2:							
Exira, moderately eroded-------------	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
						Too clayey	0.50
99E2:							
Exira, moderately eroded-------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Too clayey	0.50
100B:							
Monona--------------	75	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
100C2:							
Monona, moderately eroded-------------	50	Not limited		Not limited		Not limited	
100D2:							
Monona, moderately eroded-------------	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
100D3:							
Monona, severely eroded-------------	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
100E2:							
Monona, moderately eroded-------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
100E3:							
Monona, severely eroded-------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
100F2:							
Monona, moderately eroded-------------	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
100F3:							
Monona, severely eroded-------------	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
111D3:							
Dow, severely eroded	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
111D3:							
Monona, severely eroded-------------	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
111E3:							
Dow, severely eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Monona, severely eroded-------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
125D3:							
Ida, severely eroded	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
Chute, severely eroded-------------	30	Very limited		Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	0.63	Seepage	1.00
		Slope	0.63			Slope	0.63
125E3:							
Ida, severely eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Chute, severely eroded-------------	30	Very limited		Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00	Seepage	1.00
		Slope	1.00			Slope	1.00
133:							
Colo, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
133+:							
Colo, overwash, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
212:							
Kennebec, occasionally flooded-----------	70	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
212+:							
Kennebec, overwash, occasionally flooded-----------	90	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
220:							
Nodaway, occasionally flooded-----------	75	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too clayey	0.50				
266:							
Smithland, occasionally flooded-----------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
266+:							
Smithland, overwash, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
268D:							
Knox----------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
268E:							
Knox----------------	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
268F:							
Knox----------------	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
430:							
Ackmore, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
431B:							
Judson	55	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Ackmore, frequently flooded	25	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
Colo, overwash, frequently flooded	15	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
509B:							
Marshall, terrace	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
509C:							
Marshall, terrace	85	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
509C2:							
Marshall, terrace, moderately eroded	65	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
509D2:							
Marshall, terrace, moderately eroded	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
509E2:							
Marshall, terrace, moderately eroded	65	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
510:							
Monona, terrace	100	Not limited		Not limited		Not limited	
510B:							
Monona, terrace	60	Not limited		Not limited		Not limited	
510C2:							
Monona, terrace, moderately eroded	75	Not limited		Not limited		Not limited	
510D2:							
Monona, terrace, moderately eroded	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
510E2:							
Monona, terrace, moderately eroded--	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
630:							
Danbury, occasionally flooded-----------	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	0.86
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
670:							
Rawles, occasionally flooded-----------	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too clayey	0.50				
700:							
Monona, terrace-----	100	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
700B:							
Monona, terrace-----	75	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
700C2:							
Monona, terrace, moderately eroded--	50	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
700D2:							
Monona, terrace, moderately eroded--	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
717D:							
Napier--------------	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04	Slope	0.04
Gullied land, frequently flooded	35	Not rated		Very limited		Not rated	
				Flooding	1.00		
				Slope	0.04		
740D:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	0.63	Seepage	1.00
		Slope	0.63			Slope	0.63

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
740E:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00	Seepage	1.00
		Slope	1.00			Slope	1.00
740F:							
Hawick--------------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00
980C:							
Judson--------------	55	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Gullied land, frequently flooded	35	Not rated		Very limited		Not rated	
				Flooding	1.00		
1220:							
Nodaway, channeled, frequently flooded	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too clayey	0.50				
5010:							
Pits, sand and gravel-------------	100	Not rated		Not rated		Not rated	
5040:							
Udorthents----------	100	Not rated		Not rated		Not rated	
5080:							
Udorthents----------	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon-------	100	Not rated		Not rated		Not rated	
W:							
Water---------------	100	Not rated		Not rated		Not rated	

Construction Materials

The titles of the tables described in this section are:

- “Source of Sand and Gravel”
- “Source of Reclamation Material, Roadfill, and Topsoil”

These tables give information about the soils as potential sources of gravel, sand, reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table “Source of Sand and Gravel,” only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated as *improbable, possible, probable,* or *very likely* sources of gravel. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of gravel. The number 0.00 indicates an improbable source; 0.01 to 0.39, a possible source; 0.40 to 0.99, a probable source; and 1.00, a very likely source.

The soils are rated *good, fair,* or *poor* as potential sources of sand. A rating of good or fair means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. The larger the number, the greater the likelihood that the layer is a source of sand.

In the table “Source of Reclamation Material, Roadfill, and Topsoil,” the rating class terms are *good, fair,* and *poor*. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material, roadfill, and topsoil. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation

is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Source of Sand and Gravel

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
1C:					
Ida-----------------	95	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1C3:					
Ida, severely eroded	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1D3:					
Ida, severely eroded	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1E3:					
Ida, severely eroded	70	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1F3:					
Ida, severely eroded	70	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
8B:					
Judson--------------	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
8C:					
Judson--------------	95	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
9:					
Marshall------------	95	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
9B:					
Marshall------------	100	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
9B2:					
Marshall, moderately eroded-------------	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
9C:					
Marshall------------	90	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
9C2:					
Marshall, moderately eroded------------	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
9D:					
Marshall------------	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
9D2:					
Marshall, moderately eroded------------	70	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
9E2:					
Marshall, moderately eroded------------	70	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
9E3:					
Marshall, severely eroded------------	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
10B:					
Monona--------------	100	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
10B2:					
Monona, moderately eroded------------	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
10C2:					
Monona, moderately eroded------------	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
10D2:					
Monona, moderately eroded------------	60	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
10D3:					
Monona, severely eroded-------------	95	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
10E2:					
Monona, moderately eroded-------------	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
10E3:					
Monona, severely eroded-------------	60	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
10F2:					
Monona, moderately eroded-------------	45	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
10F3:					
Monona, severely eroded-------------	70	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
12B:					
Napier--------------	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
12C:					
Napier--------------	95	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
17B:					
Napier--------------	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Kennebec, frequently flooded------------	20	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Nodaway, frequently flooded------------	15	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
22D2:					
Dow, moderately eroded-------------	90	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
22D3:					
Dow, severely eroded	90	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
22E3:					
Dow, severely eroded	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
26:					
Kennebec, occasionally flooded------------	95	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
35D2:					
Liston, moderately eroded-------------	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Burchard, moderately eroded-------------	35	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
35E2:					
Liston, moderately eroded-------------	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Burchard, moderately eroded-------------	35	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
35F2:					
Liston, moderately eroded-------------	40	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Burchard, moderately eroded-------------	30	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
35G:					
Liston--------------	45	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Burchard------------	35	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
54:					
Zook, occasionally flooded------------	90	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
54+:					
Zook, overwash, occasionally flooded------------	90	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
59D2:					
Burchard, moderately eroded-------------	55	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
59E2:					
Burchard, moderately eroded-------------	55	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
99C2:					
Exira, moderately eroded-------------	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
99D2:					
Exira, moderately eroded-------------	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
99E2:					
Exira, moderately eroded-------------	45	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
100B:					
Monona--------------	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
100C2:					
Monona, moderately eroded-------------	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
100D2:					
Monona, moderately eroded-------------	45	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
100D3:					
Monona, severely eroded------------	45	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
100E2:					
Monona, moderately eroded------------	45	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
100E3:					
Monona, severely eroded------------	45	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
100F2:					
Monona, moderately eroded------------	55	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
100F3:					
Monona, severely eroded------------	70	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
111D3:					
Dow, severely eroded	55	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Monona, severely eroded------------	40	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
111E3:					
Dow, severely eroded	55	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Monona, severely eroded------------	40	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
125D3:					
Ida, severely eroded	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Chute, severely eroded------------	30	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.06
		Bottom layer	0.00	Bottom layer	0.26

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
125E3:					
Ida, severely eroded	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Chute, severely eroded	30	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.06
		Bottom layer	0.00	Bottom layer	0.26
133:					
Colo, occasionally flooded	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
133+:					
Colo, overwash, occasionally flooded	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
212:					
Kennebec, occasionally flooded	70	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
212+:					
Kennebec, overwash, occasionally flooded	90	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
220:					
Nodaway, occasionally flooded	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
266:					
Smithland, occasionally flooded	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
266+:					
Smithland, overwash, occasionally flooded	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
268D:					
Knox----------------	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
268E:					
Knox----------------	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
268F:					
Knox----------------	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
430:					
Ackmore, occasionally flooded------------	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
431B:					
Judson--------------	55	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Ackmore, frequently flooded------------	25	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Colo, overwash, frequently flooded	15	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
509B:					
Marshall, terrace---	90	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
509C:					
Marshall, terrace---	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
509C2:					
Marshall, terrace, moderately eroded--	65	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
509D2:					
Marshall, terrace, moderately eroded--	65	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
509E2:					
Marshall, terrace, moderately eroded--	65	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
510:					
Monona, terrace-----	100	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
510B:					
Monona, terrace-----	60	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
510C2:					
Monona, terrace, moderately eroded--	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
510D2:					
Monona, terrace, moderately eroded--	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
510E2:					
Monona, terrace, moderately eroded--	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
630:					
Danbury, occasionally flooded------------	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
670:					
Rawles, occasionally flooded------------	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
700:					
Monona, terrace-----	100	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
700B:					
Monona, terrace-----	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
700C2:					
Monona, terrace, moderately eroded--	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
700D2:					
Monona, terrace, moderately eroded--	60	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
717D:					
Napier--------------	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Gullied land, frequently flooded	35	Not rated		Not rated	
740D:					
Hawick--------------	90	Possible		Fair	
		Thickest layer	0.00	Thickest layer	0.12
		Bottom layer	0.04	Bottom layer	0.88
740E:					
Hawick--------------	90	Possible		Fair	
		Thickest layer	0.00	Thickest layer	0.12
		Bottom layer	0.04	Bottom layer	0.88
740F:					
Hawick--------------	90	Possible		Fair	
		Thickest layer	0.00	Thickest layer	0.12
		Bottom layer	0.04	Bottom layer	0.88
980C:					
Judson--------------	55	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Gullied land, frequently flooded	35	Not rated		Not rated	
1220:					
Nodaway, channeled, frequently flooded	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
5010:					
Pits, sand and gravel-------------	100	Not rated		Not rated	
5040:					
Udorthents----------	100	Not rated		Not rated	
5080:					
Udorthents----------	100	Not rated		Not rated	

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
AW:					
Animal waste lagoon	100	Not rated		Not rated	
SL:					
Sewage lagoon-------	100	Not rated		Not rated	
W:					
Water---------------	100	Not rated		Not rated	

Source of Reclamation Material, Roadfill, and Topsoil

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value	Potential as source of topsoil: Rating class and limiting features	Value
1C:							
Ida-----------------	95	Fair		Poor		Fair	
		Organic matter content	0.12	Low strength	0.00	Carbonate content	0.99
		Water erosion	0.90				
		Carbonate content	0.97				
1C3:							
Ida, severely eroded	80	Fair		Good		Good	
		Organic matter content	0.12				
		Water erosion	0.90				
		Carbonate content	0.97				
1D3:							
Ida, severely eroded	80	Fair		Good		Fair	
		Organic matter content	0.12			Slope	0.37
		Water erosion	0.90				
		Carbonate content	0.97				
1E3:							
Ida, severely eroded	70	Fair		Fair		Poor	
		Organic matter content	0.12	Slope	0.92	Slope	0.00
		Water erosion	0.90				
		Carbonate content	0.97				
1F3:							
Ida, severely eroded	70	Fair		Poor		Poor	
		Organic matter content	0.12	Slope	0.00	Slope	0.00
		Water erosion	0.90				
		Carbonate content	0.97				
8B:							
Judson--------------	80	Fair		Fair		Fair	
		Too clayey	0.88	Shrink-swell	0.87	Too clayey	0.88
		Water erosion	0.90				
8C:							
Judson--------------	95	Fair		Fair		Fair	
		Too clayey	0.88	Shrink-swell	0.87	Too clayey	0.88
		Water erosion	0.90				
9:							
Marshall------------	95	Fair		Fair		Fair	
		Organic matter content	0.50	Shrink-swell	0.97	Too clayey	0.65
		Water erosion	0.90				
		Too clayey	0.99				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9B:							
Marshall------------	100	Fair		Fair		Fair	
		Organic matter content	0.50	Shrink-swell	0.97	Too clayey	0.65
		Water erosion	0.90				
		Too clayey	0.99				
9B2:							
Marshall, moderately eroded-------------	85	Fair		Fair		Fair	
		Too clayey	0.99	Shrink-swell	0.87	Too clayey	0.77
9C:							
Marshall------------	90	Fair		Fair		Fair	
		Organic matter content	0.50	Shrink-swell	0.97	Too clayey	0.65
		Water erosion	0.90				
		Too clayey	0.99				
9C2:							
Marshall, moderately eroded-------------	80	Fair		Fair		Fair	
		Too clayey	0.99	Shrink-swell	0.87	Too clayey	0.77
9D:							
Marshall------------	85	Fair		Fair		Fair	
		Organic matter content	0.50	Shrink-swell	0.97	Slope	0.37
						Too clayey	0.65
		Water erosion	0.90				
		Too clayey	0.99				
9D2:							
Marshall, moderately eroded-------------	70	Fair		Poor		Fair	
		Too clayey	0.99	Low strength	0.00	Slope	0.37
				Shrink-swell	0.87	Too clayey	0.77
9E2:							
Marshall, moderately eroded-------------	70	Fair		Poor		Poor	
		Too clayey	0.99	Low strength	0.00	Slope	0.00
				Shrink-swell	0.87	Too clayey	0.77
				Slope	0.98		
9E3:							
Marshall, severely eroded-------------	75	Fair		Poor		Poor	
		Too clayey	0.99	Low strength	0.00	Slope	0.00
				Shrink-swell	0.87	Too clayey	0.77
				Slope	0.98		
10B:							
Monona--------------	100	Fair		Good		Good	
		Organic matter content	0.50				
		Water erosion	0.90				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
10B2:							
Monona, moderately eroded	80	Fair		Good		Good	
		Organic matter content	0.50				
		Water erosion	0.90				
10C2:							
Monona, moderately eroded	75	Fair		Good		Good	
		Organic matter content	0.50				
		Water erosion	0.90				
10D2:							
Monona, moderately eroded	60	Fair		Good		Fair	
		Organic matter content	0.50			Slope	0.37
		Water erosion	0.90				
10D3:							
Monona, severely eroded	95	Fair		Good		Fair	
		Organic matter content	0.50			Slope	0.37
		Water erosion	0.90				
10E2:							
Monona, moderately eroded	50	Fair		Fair		Poor	
		Organic matter content	0.50	Slope	0.92	Slope	0.00
		Water erosion	0.90				
10E3:							
Monona, severely eroded	60	Fair		Fair		Poor	
		Organic matter content	0.50	Slope	0.92	Slope	0.00
		Water erosion	0.90				
10F2:							
Monona, moderately eroded	45	Fair		Poor		Poor	
		Organic matter content	0.50	Slope	0.00	Slope	0.00
		Water erosion	0.90				
10F3:							
Monona, severely eroded	70	Fair		Poor		Poor	
		Organic matter content	0.50	Slope	0.00	Slope	0.00
		Water erosion	0.90				
12B:							
Napier	85	Fair		Good		Good	
		Water erosion	0.90				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value	Potential as source of topsoil: Rating class and limiting features	Value
12C:							
Napier	95	Fair		Good		Good	
		Water erosion	0.90				
17B:							
Napier	50	Fair		Good		Good	
		Water erosion	0.90				
Kennebec, frequently flooded	20	Good		Fair		Good	
				Shrink-swell	0.87		
Nodaway, frequently flooded	15	Fair		Poor		Good	
		Organic matter content	0.12	Low strength	0.00		
				Shrink-swell	0.87		
		Water erosion	0.90				
22D2:							
Dow, moderately eroded	90	Fair		Good		Fair	
		Organic matter content	0.50			Slope	0.37
		Carbonate content	0.80				
		Water erosion	0.90				
22D3:							
Dow, severely eroded	90	Fair		Good		Fair	
		Organic matter content	0.50			Slope	0.37
		Carbonate content	0.80				
		Water erosion	0.90				
22E3:							
Dow, severely eroded	80	Fair		Fair		Poor	
		Organic matter content	0.50	Slope	0.92	Slope	0.00
		Carbonate content	0.80				
		Water erosion	0.90				
26:							
Kennebec, occasionally flooded	95	Fair		Good		Good	
		Too acid	0.99				
35D2:							
Liston, moderately eroded	50	Good		Fair		Fair	
				Shrink-swell	0.87	Slope	0.37
Burchard, moderately eroded	35	Fair		Fair		Fair	
		Organic matter content	0.12	Shrink-swell	0.87	Slope	0.37
		Water erosion	0.99				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value	Potential as source of topsoil: Rating class and limiting features	Value
35E2:							
Liston, moderately eroded	50	Good		Fair		Poor	
				Shrink-swell	0.87	Slope	0.00
				Slope	0.98		
Burchard, moderately eroded	35	Fair		Fair		Poor	
		Organic matter content	0.12	Shrink-swell	0.87	Slope	0.00
		Water erosion	0.99	Slope	0.98		
35F2:							
Liston, moderately eroded	40	Good		Fair		Poor	
				Slope	0.32	Slope	0.00
				Shrink-swell	0.87		
Burchard, moderately eroded	30	Fair		Fair		Poor	
		Organic matter content	0.12	Slope	0.32	Slope	0.00
		Water erosion	0.99	Shrink-swell	0.87		
35G:							
Liston	45	Good		Poor		Poor	
				Slope	0.00	Slope	0.00
				Shrink-swell	0.87		
Burchard	35	Fair		Poor		Poor	
		Organic matter content	0.12	Slope	0.00	Slope	0.00
		Too clayey	0.98	Shrink-swell	0.87	Too clayey	0.70
		Water erosion	0.99				
54:							
Zook, occasionally flooded	90	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Shrink-swell	0.12	Too clayey	0.00
54+:							
Zook, overwash, occasionally flooded	90	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Water erosion	0.99	Shrink-swell	0.12	Too clayey	0.00
59D2:							
Burchard, moderately eroded	55	Fair		Fair		Fair	
		Organic matter content	0.12	Shrink-swell	0.87	Slope	0.37
		Water erosion	0.99				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value	Potential as source of topsoil: Rating class and limiting features	Value
59E2:							
Burchard, moderately eroded	55	Fair		Fair		Poor	
		Organic matter content	0.12	Shrink-swell	0.87	Slope	0.00
				Slope	0.98		
		Water erosion	0.99				
99C2:							
Exira, moderately eroded	80	Fair		Poor		Good	
		Organic matter content	0.50	Low strength	0.00		
				Shrink-swell	0.87		
		Water erosion	0.90				
		Too acid	0.95				
99D2:							
Exira, moderately eroded	50	Fair		Poor		Fair	
		Organic matter content	0.50	Low strength	0.00	Slope	0.37
				Shrink-swell	0.87		
		Water erosion	0.90				
		Too acid	0.95				
99E2:							
Exira, moderately eroded	45	Fair		Poor		Poor	
		Organic matter content	0.50	Low strength	0.00	Slope	0.00
				Shrink-swell	0.87		
		Water erosion	0.90	Slope	0.98		
		Too acid	0.95				
100B:							
Monona	75	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
				Shrink-swell	0.96		
100C2:							
Monona, moderately eroded	50	Fair		Poor		Good	
		Organic matter content	0.50	Low strength	0.00		
		Water erosion	0.90				
100D2:							
Monona, moderately eroded	45	Fair		Poor		Fair	
		Organic matter content	0.50	Low strength	0.00	Slope	0.37
		Water erosion	0.90				
100D3:							
Monona, severely eroded	45	Fair		Fair		Fair	
		Organic matter content	0.50			Slope	0.37
		Water erosion	0.90				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
100E2:							
Monona, moderately eroded	45	Fair		Poor		Poor	
		Organic matter content	0.50	Low strength	0.00	Slope	0.00
		Water erosion	0.90	Slope	0.92		
100E3:							
Monona, severely eroded	45	Fair		Poor		Poor	
		Organic matter content	0.12	Low strength	0.00	Slope	0.00
		Water erosion	0.90	Slope	0.92		
100F2:							
Monona, moderately eroded	55	Fair		Poor		Poor	
		Organic matter content	0.50	Low strength	0.00	Slope	0.00
		Water erosion	0.90	Slope	0.00		
100F3:							
Monona, severely eroded	70	Fair		Poor		Poor	
		Organic matter content	0.50	Slope	0.00	Slope	0.00
		Water erosion	0.90				
111D3:							
Dow, severely eroded	55	Fair		Good		Fair	
		Organic matter content	0.50			Slope	0.37
		Carbonate content	0.80				
		Water erosion	0.90				
Monona, severely eroded	40	Fair		Good		Fair	
		Organic matter content	0.50			Slope	0.37
		Water erosion	0.90				
111E3:							
Dow, severely eroded	55	Fair		Fair		Poor	
		Organic matter content	0.50	Slope	0.92	Slope	0.00
		Carbonate content	0.80			Carbonate content	0.86
		Water erosion	0.90				
Monona, severely eroded	40	Fair		Fair		Poor	
		Organic matter content	0.50	Slope	0.92	Slope	0.00
		Water erosion	0.90				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
125D3:							
Ida, severely eroded	50	Fair		Good		Fair	
		Organic matter content	0.50			Slope	0.37
		Water erosion	0.90				
		Carbonate content	0.97				
Chute, severely eroded-------------	30	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.37
		Organic matter content	0.12			Carbonate content	0.95
125E3:							
Ida, severely eroded	50	Fair		Fair		Poor	
		Organic matter content	0.50	Slope	0.92	Slope	0.00
		Water erosion	0.90				
		Carbonate content	0.97				
Chute, severely eroded-------------	30	Poor		Fair		Poor	
		Too sandy	0.00	Slope	0.92	Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Organic matter content	0.12			Carbonate content	0.95
133:							
Colo, occasionally flooded-----------	85	Fair		Poor		Poor	
		Too clayey	0.95	Wetness	0.00	Wetness	0.00
				Shrink-swell	0.87	Too clayey	0.95
133+:							
Colo, overwash, occasionally flooded-----------	85	Fair		Poor		Poor	
		Too clayey	0.95	Wetness	0.00	Wetness	0.00
				Shrink-swell	0.87	Too clayey	0.95
212:							
Kennebec, occasionally flooded-----------	70	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
				Shrink-swell	0.87		
212+:							
Kennebec, overwash, occasionally flooded-----------	90	Good		Fair		Good	
				Shrink-swell	0.87		

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value	Potential as source of topsoil: Rating class and limiting features	Value
220:							
Nodaway, occasionally flooded	75	Fair		Poor		Good	
		Organic matter content	0.12	Low strength	0.00		
		Water erosion	0.90	Shrink-swell	0.87		
266:							
Smithland, occasionally flooded	85	Fair		Poor		Poor	
		Too clayey	0.95	Wetness	0.00	Wetness	0.00
				Shrink-swell	0.87	Too clayey	0.95
266+:							
Smithland, overwash, occasionally flooded	75	Fair		Poor		Poor	
		Too clayey	0.95	Wetness	0.00	Wetness	0.00
				Shrink-swell	0.87	Too clayey	0.95
268D:							
Knox	85	Fair		Fair		Fair	
		Organic matter content	0.88	Shrink-swell	0.89	Slope	0.37
		Water erosion	0.90				
268E:							
Knox	80	Fair		Fair		Poor	
		Organic matter content	0.88	Shrink-swell	0.89	Slope	0.00
				Slope	0.92		
		Water erosion	0.90				
268F:							
Knox	75	Fair		Poor		Poor	
		Organic matter content	0.88	Slope	0.00	Slope	0.00
				Shrink-swell	0.89		
		Water erosion	0.90				
430:							
Ackmore, occasionally flooded	75	Good		Poor		Poor	
				Wetness	0.00	Wetness	0.00
				Low strength	0.00		
				Shrink-swell	0.33		
431B:							
Judson	55	Fair		Fair		Fair	
		Too clayey	0.88	Shrink-swell	0.87	Too clayey	0.88
		Water erosion	0.90				
Ackmore, frequently flooded	25	Good		Poor		Poor	
				Wetness	0.00	Wetness	0.00
				Low strength	0.00		
				Shrink-swell	0.33		

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
431B:							
Colo, overwash, frequently flooded	15	Fair		Poor		Poor	
		Too clayey	0.95	Wetness	0.00	Wetness	0.00
				Shrink-swell	0.87	Too clayey	0.95
509B:							
Marshall, terrace---	90	Fair		Fair		Fair	
		Organic matter content	0.50	Shrink-swell	0.97	Too clayey	0.65
		Water erosion	0.90				
		Too clayey	0.99				
509C:							
Marshall, terrace---	85	Fair		Fair		Fair	
		Organic matter content	0.50	Shrink-swell	0.97	Too clayey	0.65
		Water erosion	0.90				
		Too clayey	0.99				
509C2:							
Marshall, terrace, moderately eroded--	65	Fair		Poor		Fair	
		Too clayey	0.99	Low strength	0.00	Too clayey	0.77
				Shrink-swell	0.87		
509D2:							
Marshall, terrace, moderately eroded--	65	Fair		Poor		Fair	
		Too clayey	0.99	Low strength	0.00	Slope	0.37
				Shrink-swell	0.87	Too clayey	0.77
509E2:							
Marshall, terrace, moderately eroded--	65	Fair		Poor		Poor	
		Too clayey	0.99	Low strength	0.00	Slope	0.00
				Shrink-swell	0.87	Too clayey	0.77
				Slope	0.92		
510:							
Monona, terrace-----	100	Fair		Good		Good	
		Organic matter content	0.50				
		Water erosion	0.90				
510B:							
Monona, terrace-----	60	Fair		Good		Good	
		Organic matter content	0.50				
		Water erosion	0.90				
510C2:							
Monona, terrace, moderately eroded--	75	Fair		Good		Good	
		Organic matter content	0.50				
		Water erosion	0.90				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material: Rating class and limiting features	Value	Potential as source of roadfill: Rating class and limiting features	Value	Potential as source of topsoil: Rating class and limiting features	Value
510D2:							
Monona, terrace, moderately eroded--	75	Fair		Good		Fair	
		Organic matter content	0.50			Slope	0.37
		Water erosion	0.90				
510E2:							
Monona, terrace, moderately eroded--	75	Fair		Fair		Poor	
		Organic matter content	0.50	Slope	0.92	Slope	0.00
		Water erosion	0.90				
630:							
Danbury, occasionally flooded-----------	80	Good		Fair		Fair	
				Shrink-swell	0.45	Wetness	0.53
				Wetness	0.53		
670:							
Rawles, occasionally flooded-----------	80	Good		Fair		Good	
				Shrink-swell	0.87		
700:							
Monona, terrace-----	100	Fair		Fair		Good	
		Water erosion	0.90	Shrink-swell	0.96		
700B:							
Monona, terrace-----	75	Fair		Fair		Good	
		Water erosion	0.90	Shrink-swell	0.96		
700C2:							
Monona, terrace, moderately eroded--	50	Fair		Fair		Good	
		Water erosion	0.90	Shrink-swell	0.96		
700D2:							
Monona, terrace, moderately eroded--	60	Fair		Fair		Fair	
		Water erosion	0.90	Shrink-swell	0.96	Slope	0.37
717D:							
Napier--------------	50	Fair		Good		Fair	
		Water erosion	0.90			Slope	0.96
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
740D:							
Hawick--------------	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Droughty	0.09			Rock fragments	0.03
		Organic matter content	0.12			Slope	0.37

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
740E:							
Hawick	90	Poor		Fair		Poor	
		Too sandy	0.00	Slope	0.98	Too sandy	0.00
		Droughty	0.09			Slope	0.00
		Organic matter content	0.12			Rock fragments	0.03
740F:							
Hawick	90	Poor		Fair		Poor	
		Too sandy	0.00	Slope	0.18	Slope	0.00
		Droughty	0.09			Too sandy	0.00
		Organic matter content	0.12			Rock fragments	0.03
980C:							
Judson	55	Fair		Fair		Good	
		Water erosion	0.90	Shrink-swell	0.87		
Gullied land, frequently flooded	35	Not rated		Not rated		Not rated	
1220:							
Nodaway, channeled, frequently flooded	80	Fair		Poor		Good	
		Organic matter content	0.12	Low strength	0.00		
				Shrink-swell	0.87		
		Water erosion	0.90				
5010:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
5040:							
Udorthents	100	Not rated		Not rated		Not rated	
5080:							
Udorthents	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Water Management

The table “Ponds and Embankments” gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Ponds and Embankments

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1C:							
Ida	95	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
1C3:							
Ida, severely eroded	80	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
1D3:							
Ida, severely eroded	80	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
1E3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
1F3:							
Ida, severely eroded	70	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
8B:							
Judson	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.19	Depth to water	1.00
		Slope	0.08				
8C:							
Judson	95	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.92	Piping	0.19	Depth to water	1.00
		Seepage	0.72				
9:							
Marshall	95	Somewhat limited		Not limited		Very limited	
		Seepage	0.72			Depth to water	1.00
9B:							
Marshall	100	Somewhat limited		Not limited		Very limited	
		Seepage	0.72			Depth to water	1.00
		Slope	0.08				
9B2:							
Marshall, moderately eroded	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.72			Depth to water	1.00
		Slope	0.08				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9C:							
Marshall------------	90	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.72				
9C2:							
Marshall, moderately eroded------------	80	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.72				
9D:							
Marshall------------	85	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
9D2:							
Marshall, moderately eroded------------	70	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
9E2:							
Marshall, moderately eroded------------	70	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
9E3:							
Marshall, severely eroded------------	75	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
10B:							
Monona--------------	100	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.28	Depth to water	1.00
		Slope	0.08				
10B2:							
Monona, moderately eroded------------	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.32	Depth to water	1.00
		Slope	0.08				
10C2:							
Monona, moderately eroded------------	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.92	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
10D2:							
Monona, moderately eroded------------	60	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
10D3:							
Monona, severely eroded-------------	95	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
10E2:							
Monona, moderately eroded-------------	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
10E3:							
Monona, severely eroded-------------	60	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
10F2:							
Monona, moderately eroded-------------	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
10F3:							
Monona, severely eroded-------------	70	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
12B:							
Napier--------------	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.68	Depth to water	1.00
		Slope	0.08				
12C:							
Napier--------------	95	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.92	Piping	0.68	Depth to water	1.00
		Seepage	0.72				
17B:							
Napier--------------	50	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.68	Depth to water	1.00
		Slope	0.08				
Kennebec, frequently flooded------------	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.72	Piping	0.87	Depth to saturated zone	0.81
		Slope	0.08			Slow refill	0.28
						Cutbanks cave	0.10
Nodaway, frequently flooded------------	15	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Piping	1.00	Depth to saturated zone	0.81
		Slope	0.08			Slow refill	0.30
						Cutbanks cave	0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
22D2:							
Dow, moderately eroded-------------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
22D3:							
Dow, severely eroded	90	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
22E3:							
Dow, severely eroded	80	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
26:							
Kennebec, occasionally flooded------------	95	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Piping	1.00	Depth to saturated zone	0.81
						Cutbanks cave	0.10
35D2:							
Liston, moderately eroded-------------	50	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Burchard, moderately eroded-------------	35	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.04				
35E2:							
Liston, moderately eroded-------------	50	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Burchard, moderately eroded-------------	35	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.04				
35F2:							
Liston, moderately eroded-------------	40	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Burchard, moderately eroded-------------	30	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.04				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
35G:							
Liston	45	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.05				
Burchard	35	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.04				
54:							
Zook, occasionally flooded	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
						Cutbanks cave	0.10
				Hard to pack	0.96		
54+:							
Zook, overwash, occasionally flooded	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
						Cutbanks cave	0.10
				Hard to pack	0.96		
59D2:							
Burchard, moderately eroded	55	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.04				
59E2:							
Burchard, moderately eroded	55	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.04				
99C2:							
Exira, moderately eroded	80	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.72				
99D2:							
Exira, moderately eroded	50	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
99E2:							
Exira, moderately eroded	45	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
100B:							
Monona	75	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.24	Depth to water	1.00

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
100C2:							
Monona, moderately eroded------------	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.92	Piping	0.36	Depth to water	1.00
		Seepage	0.72				
100D2:							
Monona, moderately eroded------------	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.36	Depth to water	1.00
		Seepage	0.72				
100D3:							
Monona, severely eroded------------	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.30	Depth to water	1.00
		Seepage	0.72				
100E2:							
Monona, moderately eroded------------	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.36	Depth to water	1.00
		Seepage	0.72				
100E3:							
Monona, severely eroded------------	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.28	Depth to water	1.00
		Seepage	0.70				
100F2:							
Monona, moderately eroded------------	55	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.36	Depth to water	1.00
		Seepage	0.72				
100F3:							
Monona, severely eroded------------	70	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.30	Depth to water	1.00
		Seepage	0.72				
111D3:							
Dow, severely eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
Monona, severely eroded------------	40	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
111E3:							
Dow, severely eroded	55	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
111E3:							
Monona, severely eroded	40	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
125D3:							
Ida, severely eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
Chute, severely eroded	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.26	Depth to water	1.00
		Slope	1.00				
125E3:							
Ida, severely eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.72				
Chute, severely eroded	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.26	Depth to water	1.00
		Slope	1.00				
133:							
Colo, occasionally flooded	85	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	1.00	Slow refill	0.28
						Cutbanks cave	0.10
133+:							
Colo, overwash, occasionally flooded	85	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	1.00	Slow refill	0.28
						Cutbanks cave	0.10
212:							
Kennebec, occasionally flooded	70	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Piping	0.99	Depth to saturated zone	0.81
						Slow refill	0.28
						Cutbanks cave	0.10
212+:							
Kennebec, overwash, occasionally flooded	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.72	Piping	0.87	Depth to saturated zone	0.81
						Slow refill	0.28
						Cutbanks cave	0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
220:							
Nodaway, occasionally flooded-----------	75	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Piping	1.00	Depth to saturated zone	0.81
						Slow refill	0.30
						Cutbanks cave	0.10
266:							
Smithland, occasionally flooded-----------	85	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	1.00	Slow refill	0.28
						Cutbanks cave	0.10
266+:							
Smithland, overwash, occasionally flooded-----------	75	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	1.00	Slow refill	0.28
						Cutbanks cave	0.10
268D:							
Knox----------------	85	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
268E:							
Knox----------------	80	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
268F:							
Knox----------------	75	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
430:							
Ackmore, occasionally flooded-----------	75	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	1.00	Slow refill	0.28
						Cutbanks cave	0.10
				Piping	0.02		
431B:							
Judson--------------	55	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.19	Depth to water	1.00
Ackmore, frequently flooded-----------	25	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	1.00	Slow refill	0.28
						Cutbanks cave	0.10
				Piping	0.02		

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
431B:							
Colo, overwash, frequently flooded	15	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	1.00	Slow refill	0.28
						Cutbanks cave	0.10
509B:							
Marshall, terrace---	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.72			Depth to water	1.00
509C:							
Marshall, terrace---	85	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.72				
509C2:							
Marshall, terrace, moderately eroded--	65	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to water	1.00
		Seepage	0.72				
509D2:							
Marshall, terrace, moderately eroded--	65	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
509E2:							
Marshall, terrace, moderately eroded--	65	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.72				
510:							
Monona, terrace-----	100	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.28	Depth to water	1.00
510B:							
Monona, terrace-----	60	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.28	Depth to water	1.00
510C2:							
Monona, terrace, moderately eroded--	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.92	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
510D2:							
Monona, terrace, moderately eroded--	75	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
510E2:							
Monona, terrace, moderately eroded--	75	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
630:							
Danbury, occasionally flooded-----------	80	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	0.99	Slow refill	0.28
				Piping	0.02	Cutbanks cave	0.10
						Depth to saturated zone	0.01
670:							
Rawles, occasionally flooded-----------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.72	Piping	0.84	Depth to saturated zone	0.81
						Slow refill	0.28
						Cutbanks cave	0.10
700:							
Monona, terrace-----	100	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.24	Depth to water	1.00
700B:							
Monona, terrace-----	75	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.24	Depth to water	1.00
		Slope	0.08				
700C2:							
Monona, terrace, moderately eroded--	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.92	Piping	0.24	Depth to water	1.00
		Seepage	0.72				
700D2:							
Monona, terrace, moderately eroded--	60	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.24	Depth to water	1.00
		Seepage	0.72				
717D:							
Napier--------------	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.68	Depth to water	1.00
		Seepage	0.72				
Gullied land, frequently flooded	35	Very limited		Not rated		Not rated	
		Slope	1.00				
740D:							
Hawick--------------	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.88	Depth to water	1.00
		Slope	1.00				
740E:							
Hawick--------------	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.88	Depth to water	1.00
		Slope	1.00				

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
740F:							
Hawick--------------	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.88	Depth to water	1.00
		Slope	1.00				
980C:							
Judson--------------	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.92	Piping	0.19	Depth to water	1.00
		Seepage	0.72				
Gullied land, frequently flooded	35	Somewhat limited		Not rated		Not rated	
		Slope	0.92				
1220:							
Nodaway, channeled, frequently flooded	80	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Piping	1.00	Depth to saturated zone	0.81
						Slow refill	0.30
						Cutbanks cave	0.10
5010:							
Pits, sand and gravel-------------	100	Not rated		Not rated		Not rated	
5040:							
Udorthents----------	100	Not rated		Not rated		Not rated	
5080:							
Udorthents----------	100	Not rated		Not rated		Not rated	
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon-------	100	Not rated		Not rated		Not rated	
W:							
Water---------------	100	Not rated		Not rated		Not rated	

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Properties

The table described in this section gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system and the system adopted by the American Association of State Highway and Transportation Officials.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487–00.

Engineering Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
		In				Pct	Pct					Pct	
1C:													
Ida-------------	95	0-8	Silt loam	ML	A-4, A-6	0	0	100	100	95-100	95-100	30-40	5-15
		8-60	Silt loam	ML	A-4, A-6	0	0	100	100	95-100	95-100	30-40	5-15
1C3:													
Ida, severely eroded---------	80	0-3	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
		3-80	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
1D3:													
Ida, severely eroded---------	80	0-3	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
		3-80	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
1E3:													
Ida, severely eroded---------	70	0-3	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
		3-80	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
1F3:													
Ida, severely eroded---------	70	0-3	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
		3-80	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
8B:													
Judson----------	80	0-9	Silty clay loam	CL, ML	A-6, A-7	0	0	100	100	100	95-100	35-50	10-25
		9-28	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	30-50	15-25
		28-52	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	0	100	100	100	95-100	25-50	5-25
		52-60	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	0	100	100	100	95-100	25-50	5-25
8C:													
Judson----------	95	0-9	Silty clay loam	CL, ML	A-6, A-7	0	0	100	100	100	95-100	35-50	10-25
		9-28	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	30-50	15-25
		28-52	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	0	100	100	100	95-100	25-50	5-25
		52-60	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	0	100	100	100	95-100	25-50	5-25
9:													
Marshall--------	95	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-22	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		22-65	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		65-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
9B:													
Marshall--------	100	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-22	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		22-65	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		65-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
9B2:													
Marshall, moderately eroded---------	85	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-47	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		47-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
9C:													
Marshall--------	90	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-22	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		22-65	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		65-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
9C2:													
Marshall, moderately eroded---------	80	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-47	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		47-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
9D:													
Marshall--------	85	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-22	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		22-65	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		65-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
9D2:													
Marshall, moderately eroded---------	70	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-47	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		47-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
9E2:													
Marshall, moderately eroded---------	70	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-47	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		47-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
9E3:													
Marshall, severely eroded	75	0-5	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		5-46	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		46-68	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
10B:													
Monona----------	100	0-8	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		8-15	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		15-30	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
10B2:													
Monona, moderately eroded---------	80	0-7	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
10C2:													
Monona, moderately eroded---------	75	0-7	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
10D2:													
Monona, moderately eroded---------	60	0-7	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
10D3:													
Monona, severely eroded---------	95	0-7	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
10E2:													
Monona, moderately eroded---------	50	0-7	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
10E3:													
Monona, severely eroded---------	60	0-7	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
10F2:													
Monona, moderately eroded---------	45	0-7	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
10F3:													
Monona, severely eroded---------	70	0-7	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML	A-7, A-6	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
12B:													
Napier----------	85	0-8	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		8-29	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		29-48	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		48-60	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
12C:													
Napier----------	95	0-8	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		8-29	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		29-48	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		48-60	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
17B:													
Napier----------	50	0-8	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		8-29	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		29-48	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		48-60	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
Kennebec, frequently flooded--------	20	0-8	Silt loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	25-45	10-20
		8-41	Silt loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	25-45	10-20
		41-54	Silt loam, silty clay loam	CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
		54-80	Silt loam, silty clay loam	CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
Nodaway, frequently flooded--------	15	0-7	Silt loam	CL	A-6, A-4	0	0	100	94-100	90-100	86-100	25-35	5-15
		7-31	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-99	25-40	5-15
		31-42	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-100	25-40	5-15
		42-80	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-99	25-40	5-15

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
22D2:													
Dow, moderately eroded---------	90	0-6	Silt loam	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	95-100	25-40	5-15
		6-80	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	5-15
22D3:													
Dow, severely eroded---------	90	0-6	Silt loam	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	95-100	25-40	5-15
		6-80	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	5-15
22E3:													
Dow, severely eroded---------	80	0-6	Silt loam	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	95-100	25-40	5-15
		6-80	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	5-15
26:													
Kennebec, occasionally flooded--------	95	0-8	Silty clay loam	CL	A-6	0	0	95-100	95-100	95-100	95-100	30-40	10-20
		8-41	Silty clay loam	ML	A-4	0	0	95-100	95-100	95-100	95-100	25-40	5-12
		41-54	Silty clay loam	ML	A-4	0	0	95-100	95-100	95-100	95-100	---	NP
		54-80	Silty clay loam	ML	A-4	0	0	95-100	95-100	95-100	95-100	---	NP
35D2:													
Liston, moderately eroded---------	50	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	30-50	15-25
		5-38	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	70-90	30-55	12-30
		38-80	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	60-75	25-55	10-30
Burchard, moderately eroded---------	35	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-95	60-80	35-50	14-24
		5-13	Clay loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		13-37	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		37-80	Clay loam, loam		A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	15-30

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
35E2:													
Liston, moderately eroded---------	50	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	30-50	15-25
		5-38	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	70-90	30-55	12-30
		38-80	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	60-75	25-55	10-30
Burchard, moderately eroded---------	35	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-95	60-80	35-50	14-24
		5-13	Clay loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		13-37	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		37-80	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	15-30
35F2:													
Liston, moderately eroded---------	40	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	30-50	15-25
		5-38	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	70-90	30-55	12-30
		38-80	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	60-75	25-55	10-30
Burchard, moderately eroded---------	30	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-95	60-80	35-50	14-24
		5-13	Clay loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		13-37	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		37-80	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	15-30
35G:													
Liston----------	45	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	30-50	15-25
		5-38	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	70-90	30-55	12-30
		38-80	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	60-75	25-55	10-30
Burchard--------	35	0-11	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-95	60-80	35-50	14-24
		11-24	Clay loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		24-36	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		36-60	Clay loam, loam	CL	A-7, A-6	0	0-5	95-100	85-100	75-95	60-80	35-50	15-30

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
54:													
Zook, occasionally flooded--------	90	0-6	Silty clay loam	CL	A-7	0	0	100	100	95-100	95-100	45-65	20-35
		6-20	Silty clay loam	CL	A-7	0	0	100	100	95-100	95-100	45-65	20-35
		20-52	Silty clay, silty clay loam	CH	A-7	0	0	100	100	95-100	95-100	60-85	35-55
		52-60	Silty clay loam, silty clay, silt loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-80	10-50
54+:													
Zook, overwash, occasionally flooded--------	90	0-6	Silt loam	CL	A-7	0	0	100	100	95-100	95-100	45-65	20-35
		6-20	Silty clay loam	CL	A-7	0	0	100	100	95-100	95-100	45-65	20-35
		20-52	Silty clay, silty clay loam	CH	A-7	0	0	100	100	95-100	95-100	60-85	35-55
		52-60	Silty clay loam, silty clay, silt loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-80	10-50
59D2:													
Burchard, moderately eroded---------	55	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-95	60-80	35-50	14-24
		5-13	Clay loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		13-37	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		37-80	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	15-30
59E2:													
Burchard, moderately eroded---------	55	0-5	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-95	60-80	35-50	14-24
		5-13	Clay loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		13-37	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	20-30
		37-80	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	35-50	15-30

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
		In				Pct	Pct					Pct	
99C2:													
Exira, moderately eroded---------	80	0-6	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		6-40	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		40-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
99D2:													
Exira, moderately eroded---------	50	0-6	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		6-40	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		40-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
99E2:													
Exira, moderately eroded---------	45	0-6	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		6-40	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		40-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
100B:													
Monona----------	75	0-7	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-20	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		20-48	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		48-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
100C2:													
Monona, moderately eroded---------	50	0-6	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		6-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
100D2:													
Monona, moderately eroded---------	45	0-6	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		6-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
100D3:													
Monona, severely eroded---------	45	0-7	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-36	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		36-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
100E2:													
Monona, moderately eroded---------	45	0-6	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		6-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
100E3:													
Monona, severely eroded---------	45	0-7	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-36	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		36-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
		In				Pct	Pct					Pct	
100F2:													
Monona, moderately eroded---------	55	0-6	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		6-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
100F3:													
Monona, severely eroded---------	70	0-7	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-36	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		36-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
111D3:													
Dow, severely eroded---------	55	0-6	Silt loam	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	95-100	25-40	5-15
		6-80	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	5-15
Monona, severely eroded---------	40	0-7	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-36	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		36-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
111E3:													
Dow, severely eroded---------	55	0-6	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	5-15
		6-60	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	5-15
Monona, severely eroded---------	40	0-7	Silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-36	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		36-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
125D3:													
Ida, severely eroded---------	50	0-3	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
		3-80	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
Chute, severely eroded---------	30	0-4	Loamy fine sand	SM	A-2	0	0	100	100	70-85	10-35	0-14	NP
		4-60	Fine sand, sand, loamy fine sand	SM	A-2, A-3	0	0	100	95-100	70-95	5-25	0-14	NP
125E3:													
Ida, severely eroded---------	50	0-3	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
		3-80	Silt loam	ML	A-6, A-4	0	0	100	100	95-100	95-100	30-40	5-15
Chute, severely eroded---------	30	0-4	Loamy fine sand	SM	A-2	0	0	100	100	70-85	10-35	0-14	NP
		4-60	Fine sand, sand, loamy fine sand	SM	A-2, A-3	0	0	100	95-100	70-95	5-25	0-14	NP
133:													
Colo, occasionally flooded--------	85	0-8	Silty clay loam	CL, CH	A-7	0	0	100	100	90-100	90-100	40-60	15-30
		8-34	Silty clay loam	CL, CH	A-7	0	0	100	100	90-100	90-100	40-60	15-30
		34-51	Silty clay loam	CH, CL	A-7	0	0	100	100	90-100	90-100	40-55	20-30
		51-60	Silty clay loam, clay loam, silt loam	CH, CL	A-7	0	0	100	100	95-100	80-100	40-55	15-30
133+:													
Colo, overwash, occasionally flooded--------	85	0-8	Silty clay loam, silt loam	CH, CL	A-7	0	0	100	100	95-100	80-100	40-55	15-30
		8-34	Silty clay loam	CL, CH	A-7	0	0	100	100	90-100	90-100	40-60	15-30
		34-51	Silty clay loam	CH, CL	A-7	0	0	100	100	90-100	90-100	40-55	20-30
		51-60	Silty clay loam, clay loam, silt loam	CH, CL	A-7	0	0	100	100	95-100	80-100	40-55	15-30

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
212: Kennebec, occasionally flooded--------	70	0-8	Silt loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	25-45	10-20
		8-41	Silt loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	25-45	10-20
		41-54	Silt loam, silty clay loam	CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
		54-80	Silt loam, silty clay loam	CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
212+: Kennebec, overwash, occasionally flooded--------	90	0-8	Silt loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	25-45	10-20
		8-41	Silt loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	25-45	10-20
		41-54	Silt loam, silty clay loam	CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
		54-80	Silt loam, silty clay loam	CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
220: Nodaway, occasionally flooded--------	75	0-7	Silt loam	CL	A-6, A-4	0	0	100	94-100	90-100	86-100	25-35	5-15
		7-31	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-99	25-40	5-15
		31-42	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-100	25-40	5-15
		42-80	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-99	25-40	5-15

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
266:													
Smithland, occasionally flooded--------	85	0-7	Silty clay loam	CL	A-7	0	0	100	100	90-100	90-100	40-60	15-30
		7-34	Silty clay loam	CL	A-7	0	0	100	100	90-100	90-100	40-60	15-30
		34-50	Silty clay loam	CL	A-7	0	0	100	100	90-100	90-100	40-55	20-30
		50-60	Silty clay loam, clay loam, silt loam	CL	A-7	0	0	100	100	95-100	80-100	40-55	15-30
266+:													
Smithland, overwash, occasionally flooded--------	75	0-8	Silt loam	CL	A-7	0	0	100	100	90-100	90-100	40-60	15-30
		8-34	Silty clay loam	CL	A-7	0	0	100	100	90-100	90-100	40-60	15-30
		34-50	Silty clay loam	CL	A-7	0	0	100	100	90-100	90-100	40-55	20-30
		50-60	Silty clay loam, clay loam, silt loam	CL	A-7	0	0	100	100	95-100	80-100	40-55	15-30
268D:													
Knox------------	85	0-7	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-35	2-15
		7-12	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-35	2-15
		12-61	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	95-100	40-50	20-30
		61-70	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	10-25
268E:													
Knox------------	80	0-7	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-35	2-15
		7-12	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-35	2-15
		12-61	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	95-100	40-50	20-30
		61-70	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	10-25
268F:													
Knox------------	75	0-7	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-35	2-15
		7-12	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-35	2-15
		12-61	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	95-100	40-50	20-30
		61-70	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	10-25

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
430:													
Ackmore, occasionally flooded--------	75	0-6	Silt loam	ML, CL	A-4, A-7, A-6	0	0	100	100	95-100	85-100	25-50	8-20
		6-25	Silt loam, silty clay loam	CL, ML	A-6, A-4, A-7	0	0	100	100	95-100	85-100	25-50	8-20
		25-60	Silty clay loam, silt loam	CH, CL	A-6, A-7	0	0	100	100	95-100	85-100	35-60	15-30
431B:													
Judson----------	55	0-9	Silty clay loam	CL, ML	A-6, A-7	0	0	100	100	100	95-100	35-50	10-25
		9-28	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	30-50	15-25
		28-52	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	0	100	100	100	95-100	25-50	5-25
		52-60	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	0	100	100	100	95-100	25-50	5-25
Ackmore, frequently flooded--------	25	0-6	Silt loam	ML, CL	A-4, A-7, A-6	0	0	100	100	95-100	85-100	25-50	8-20
		6-25	Silt loam, silty clay loam	CL, ML	A-6, A-4, A-7	0	0	100	100	95-100	85-100	25-50	8-20
		25-60	Silty clay loam, silt loam	CH, CL	A-6, A-7	0	0	100	100	95-100	85-100	35-60	15-30
Colo, overwash, frequently flooded--------	15	0-8	Silty clay loam, clay loam, silt loam	CH, CL	A-7	0	0	100	100	95-100	80-100	40-55	15-30
		8-34	Silty clay loam	CL, CH	A-7	0	0	100	100	90-100	90-100	40-60	15-30
		34-51	Silty clay loam	CH, CL	A-7	0	0	100	100	90-100	90-100	40-55	20-30
		51-60	Silty clay loam, clay loam, silt loam	CH, CL	A-7	0	0	100	100	95-100	80-100	40-55	15-30
509B:													
Marshall, terrace--------	90	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-22	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		22-65	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		65-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
509C:													
Marshall, terrace	85	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-22	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		22-65	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
		65-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
509C2:													
Marshall, terrace, moderately eroded	65	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-47	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		47-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
509D2:													
Marshall, terrace, moderately eroded	65	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-47	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		47-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
509E2:													
Marshall, terrace, moderately eroded	65	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		7-47	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25
		47-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	15-25

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
510:													
Monona, terrace	100	0-8	Silt loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		8-15	Silt loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		15-30	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
510B:													
Monona, terrace	60	0-8	Silt loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		8-15	Silt loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		15-30	Silt loam, silty clay loam	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
510C2:													
Monona, terrace, moderately eroded---------	75	0-7	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
510D2:													
Monona, terrace, moderately eroded---------	75	0-7	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
510E2:													
Monona, terrace, moderately eroded---------	75	0-7	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		7-24	Silt loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-25
		24-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
630:													
Danbury, occasionally flooded	80	0-7	Silt loam, silty clay loam	ML	A-6	0	0	100	100	95-100	85-100	25-50	8-20
		7-32	Silty clay loam, silt loam	ML	A-6	0	0	100	100	95-100	85-100	25-50	8-20
		32-64	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	85-100	35-60	15-30
		64-80	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	85-100	35-60	15-30
670:													
Rawles, occasionally flooded	80	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	100	90-100	25-40	5-15
		8-26	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	100	90-100	25-40	5-15
		26-60	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	100	90-100	30-45	10-20
700:													
Monona, terrace	100	0-6	Silty clay loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		6-16	Silty clay loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		16-49	Silty clay loam, silt loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		49-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
700B:													
Monona, terrace	75	0-6	Silty clay loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		6-16	Silty clay loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		16-49	Silty clay loam, silt loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		49-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
700C2:													
Monona, terrace, moderately eroded---------	50	0-6	Silty clay loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		6-49	Silty clay loam, silt loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		49-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
700D2:													
Monona, terrace, moderately eroded---------	60	0-6	Silty clay loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		6-49	Silty clay loam, silt loam	ML	A-7	0	0	100	100	95-100	95-100	35-50	10-25
		49-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
717D:													
Napier----------	50	0-8	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		8-29	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		29-48	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
		48-60	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	8-20
Gullied land, frequently flooded--------	35	---	---	---	---	---	---	---	---	---	---	---	---
740D:													
Hawick----------	90	0-7	Gravelly sandy loam	SM, SP-SM	A-1, A-3, A-2	0-2	0-5	75-95	60-95	35-70	5-35	0-14	NP-4
		7-11	Gravelly loamy sand, gravelly coarse sand, loamy sand	SP-SM	A-1, A-2, A-3	0-2	0-5	75-95	60-95	35-70	5-25	0-14	NP
		11-80	Gravelly coarse sand	SP-SM, SP	A-2, A-1, A-3	0-2	0-5	60-95	50-95	30-65	2-10	0-14	NP

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
740E:													
Hawick----------	90	0-7	Gravelly sandy loam	SM, SP-SM	A-1, A-3, A-2	0-2	0-5	75-95	60-95	35-70	5-35	0-14	NP-4
		7-11	Gravelly loamy sand, gravelly coarse sand, loamy sand	SP-SM	A-1, A-2, A-3	0-2	0-5	75-95	60-95	35-70	5-25	0-14	NP
		11-80	Gravelly coarse sand	SP-SM, SP	A-2, A-1, A-3	0-2	0-5	60-95	50-95	30-65	2-10	0-14	NP
740F:													
Hawick----------	90	0-7	Gravelly sandy loam	SM, SP-SM	A-1, A-3, A-2	0-2	0-5	75-95	60-95	35-70	5-35	0-14	NP-4
		7-11	Gravelly loamy sand, gravelly coarse sand, loamy sand	SP-SM	A-1, A-2, A-3	0-2	0-5	75-95	60-95	35-70	5-25	0-14	NP
		11-80	Gravelly coarse sand	SP-SM, SP	A-2, A-1, A-3	0-2	0-5	60-95	50-95	30-65	2-10	0-14	NP
980C:													
Judson----------	55	0-9	Silty clay loam	CL, ML	A-6, A-7	0	0	100	100	100	95-100	35-50	10-25
		9-28	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	30-50	15-25
		28-52	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	0	100	100	100	95-100	25-50	5-25
		52-60	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	0	100	100	100	95-100	25-50	5-25
Gullied land, frequently flooded--------	35	---	---	---	---	---	---	---	---	---	---	---	---

Engineering Properties--Continued

Map symbol and soil name	Pct. of map unit	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
		In				Pct	Pct					Pct	
1220:													
Nodaway, channeled, frequently flooded--------	80	0-7	Silt loam	CL	A-6, A-4	0	0	100	94-100	90-100	86-100	25-35	5-15
		7-31	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-99	25-40	5-15
		31-42	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-100	25-40	5-15
		42-80	Stratified silt loam to silty clay loam, silt loam, silty clay loam	CL	A-6, A-4	0	0	100	94-100	88-100	84-99	25-40	5-15
5010. Pits, sand and gravel													
5040. Udorthents													
5080. Udorthents													
AW. Animal waste lagoon													
SL. Sewage lagoon													
W. Water													

Physical Properties

The table described in this section shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$- or $^{1}/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (Ksat). The estimates in the table indicate the rate of water movement, in micrometers per second, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the “National Soil Survey Handbook,” which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
1C:													
Ida-------------------	95	0-8	18-27	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.32	.32	5	4L	86
		8-60	18-25	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
1C3:													
Ida, severely eroded--	80	0-3	18-27	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		3-80	18-25	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
1D3:													
Ida, severely eroded--	80	0-3	18-27	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		3-80	18-25	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
1E3:													
Ida, severely eroded--	70	0-3	18-27	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		3-80	18-25	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
1F3:													
Ida, severely eroded--	70	0-3	18-27	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		3-80	18-25	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
8B:													
Judson----------------	80	0-9	27-32	1.30-1.35	0.6-2	0.21-0.23	3.0-5.9	3.0-4.0	.28	.28	5	7	38
		9-28	30-35	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	3.0-3.5	.28	.28			
		28-52	25-32	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	1.0-2.0	.43	.43			
		52-60	25-32	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	0.5-1.0	.43	.43			
8C:													
Judson----------------	95	0-9	27-32	1.30-1.35	0.6-2	0.21-0.23	3.0-5.9	3.0-4.0	.28	.28	5	7	38
		9-28	30-35	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	3.0-3.5	.28	.28			
		28-52	25-32	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	1.0-2.0	.43	.43			
		52-60	25-32	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	0.5-1.0	.43	.43			
9:													
Marshall--------------	95	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28	5	6	48
		7-22	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28			
		22-65	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
		65-80	22-30	1.30-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
9B:													
Marshall--------------	100	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28	5	6	48
		7-22	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28			
		22-65	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
		65-80	22-30	1.30-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			
9B2:													
Marshall, moderately eroded---------------	85	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-47	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	1.0-1.5	.32	.32			
		47-80	23-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
9C:													
Marshall--------------	90	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28	5	7	38
		7-22	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28			
		22-65	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
		65-80	22-30	1.30-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			
9C2:													
Marshall, moderately eroded---------------	80	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-47	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	1.0-1.5	.32	.32			
		47-80	23-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
9D:													
Marshall--------------	85	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28	5	7	38
		7-22	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28			
		22-65	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
		65-80	22-30	1.30-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			
9D2:													
Marshall, moderately eroded---------------	70	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		7-47	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	1.0-1.5	.32	.32			
		47-80	23-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
9E2:													
Marshall, moderately eroded---------------	70	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		7-47	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	1.0-1.5	.32	.32			
		47-80	23-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
9E3:													
Marshall, severely eroded	75	0-5	27-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	1.0-2.0	.32	.32	4	7	38
		5-46	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.32	.32			
		46-68	23-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
10B:													
Monona	100	0-8	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-4.0	.28	.28	5	6	48
		8-15	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-3.5	.28	.28			
		15-30	24-32	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		30-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
10B2:													
Monona, moderately eroded	80	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-1.5	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
10C2:													
Monona, moderately eroded	75	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-1.5	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
10D2:													
Monona, moderately eroded	60	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-1.5	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
10D3:													
Monona, severely eroded	95	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	1.0-2.0	.43	.43	4	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
10E2:													
Monona, moderately eroded	50	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-1.5	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
10E3:													
Monona, severely eroded---------------	60	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	1.0-2.0	.43	.43	4	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
10F2:													
Monona, moderately eroded---------------	45	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-1.5	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
10F3:													
Monona, severely eroded---------------	70	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	1.0-2.0	.43	.43	4	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
12B:													
Napier----------------	85	0-8	20-27	1.20-1.25	0.6-2	0.22-0.24	0.0-2.9	3.0-4.0	.28	.28	5	6	48
		8-29	20-27	1.20-1.25	0.6-2	0.22-0.24	0.0-2.9	3.0-3.5	.28	.28			
		29-48	20-27	1.25-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43			
		48-60	20-27	1.25-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
12C:													
Napier----------------	95	0-8	20-27	1.20-1.25	0.6-2	0.22-0.24	0.0-2.9	3.0-4.0	.28	.28	5	6	48
		8-29	20-27	1.20-1.25	0.6-2	0.22-0.24	0.0-2.9	3.0-3.5	.28	.28			
		29-48	20-27	1.25-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43			
		48-60	20-27	1.25-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
17B:													
Napier----------------	50	0-8	20-27	1.20-1.25	0.6-2	0.22-0.24	0.0-2.9	3.0-4.0	.28	.28	5	6	48
		8-29	20-27	1.20-1.25	0.6-2	0.22-0.24	0.0-2.9	3.0-3.5	.28	.28			
		29-48	20-27	1.25-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43			
		48-60	20-27	1.25-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
Kennebec, frequently flooded-------------	20	0-8	22-26	1.25-1.35	0.6-2	0.22-0.24	3.0-5.9	2.0-4.0	.28	.28	5	6	48
		8-41	24-32	1.25-1.35	0.6-2	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28			
		41-54	24-32	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	5.0-6.0	.43	.43			
		54-80	24-30	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
17B:													
Nodaway, frequently flooded--------------	15	0-7	18-27	1.25-1.35	0.6-2	0.20-0.23	0.0-2.9	2.0-4.0	.32	.32	5	6	48
		7-31	18-28	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
		31-42	18-30	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
		42-80	18-28	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
22D2:													
Dow, moderately eroded	90	0-6	18-25	1.20-1.45	0.6-2	0.22-0.24	0.0-2.9	2.0-3.0	.43	.43	5	4L	86
		6-80	18-25	1.30-1.45	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
22D3:													
Dow, severely eroded--	90	0-6	18-25	1.20-1.45	0.6-2	0.22-0.24	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		6-80	18-25	1.30-1.45	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
22E3:													
Dow, severely eroded--	80	0-6	18-25	1.20-1.45	0.6-2	0.22-0.24	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		6-80	18-25	1.30-1.45	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
26:													
Kennebec, occasionally flooded--------------	95	0-8	27-30	1.25-1.40	0.6-2	0.22-0.24	0.0-2.9	5.0-6.0	.28	.28	5	6	48
		8-41	27-32	1.35-1.50	0.6-2	0.14-0.19	0.0-2.9	5.0-5.5	.32	.32			
		41-54	27-33	1.55-1.65	0.6-2	0.02-0.04	0.0-2.9	2.0-3.0	.10	.10			
		54-80	27-30	1.55-1.65	0.6-2	0.02-0.04	0.0-2.9	2.0-3.0	.10	.10			
35D2:													
Liston, moderately eroded---------------	50	0-5	24-35	1.30-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.32	.32	5	4L	86
		5-38	27-33	1.30-1.60	0.2-0.6	0.15-0.17	3.0-5.9	1.0-2.0	.32	.32			
		38-80	26-40	1.50-1.80	0.2-0.6	0.14-0.19	3.0-5.9	0.5-1.0	.32	.32			
Burchard, moderately eroded---------------	35	0-5	18-30	1.40-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.28	.28	5	6	48
		5-13	27-35	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		13-37	18-30	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		37-80	18-30	1.40-1.60	0.2-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
35E2:													
Liston, moderately eroded---------------	50	0-5	24-35	1.30-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.32	.32	5	4L	86
		5-38	27-33	1.30-1.60	0.2-0.6	0.15-0.17	3.0-5.9	1.0-2.0	.32	.32			
		38-80	26-40	1.50-1.80	0.2-0.6	0.14-0.19	3.0-5.9	0.5-1.0	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
35E2:													
Burchard, moderately eroded----------------	35	0-5	18-30	1.40-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.28	.28	5	6	48
		5-13	27-35	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		13-37	18-30	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		37-80	18-30	1.40-1.60	0.2-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
35F2:													
Liston, moderately eroded----------------	40	0-5	24-35	1.30-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.32	.32	5	4L	86
		5-38	27-33	1.30-1.60	0.2-0.6	0.15-0.17	3.0-5.9	1.0-2.0	.32	.32			
		38-80	26-40	1.50-1.80	0.2-0.6	0.14-0.19	3.0-5.9	0.5-1.0	.32	.32			
Burchard, moderately eroded----------------	30	0-5	18-30	1.40-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.28	.28	5	6	48
		5-13	27-35	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		13-37	18-30	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		37-80	18-30	1.40-1.60	0.2-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
35G:													
Liston----------------	45	0-5	24-35	1.30-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.32	.32	5	4L	86
		5-38	27-33	1.30-1.60	0.2-0.6	0.15-0.17	3.0-5.9	1.0-2.0	.32	.32			
		38-80	26-40	1.50-1.80	0.2-0.6	0.14-0.19	3.0-5.9	0.5-1.0	.32	.32			
Burchard--------------	35	0-11	18-30	1.40-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-4.0	.28	.28	5	6	48
		11-24	27-35	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		24-36	18-30	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		36-60	18-30	1.40-1.60	0.2-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
54:													
Zook, occasionally flooded--------------	90	0-6	35-40	1.30-1.35	0.2-0.6	0.21-0.23	6.0-8.9	5.0-7.0	.37	.37	5	7	38
		6-20	35-40	1.30-1.35	0.2-0.6	0.21-0.23	6.0-8.9	5.0-6.5	.37	.37			
		20-52	36-45	1.30-1.45	0.06-0.2	0.11-0.13	6.0-8.9	2.0-4.0	.28	.28			
		52-60	20-45	1.30-1.45	0.06-0.2	0.11-0.22	6.0-8.9	0.0-1.0	.28	.28			
54+:													
Zook, overwash, occasionally flooded	90	0-6	22-27	1.30-1.35	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37	5	7	38
		6-20	35-40	1.30-1.35	0.2-0.6	0.21-0.23	6.0-8.9	5.0-6.5	.37	.37			
		20-52	36-45	1.30-1.45	0.06-0.2	0.11-0.13	6.0-8.9	2.0-4.0	.28	.28			
		52-60	20-45	1.30-1.45	0.06-0.2	0.11-0.22	6.0-8.9	0.0-1.0	.28	.28			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
59D2:													
Burchard, moderately eroded---------------	55	0-5	18-30	1.40-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.28	.28	5	6	48
		5-13	27-35	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		13-37	18-30	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		37-80	18-30	1.40-1.60	0.2-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
59E2:													
Burchard, moderately eroded---------------	55	0-5	18-30	1.40-1.60	0.2-0.6	0.17-0.19	3.0-5.9	2.0-3.0	.28	.28	5	6	48
		5-13	27-35	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		13-37	18-30	1.40-1.60	0.2-0.6	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
		37-80	18-30	1.40-1.60	0.2-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
99C2:													
Exira, moderately eroded---------------	80	0-6	28-34	1.25-1.35	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-40	25-35	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
		40-80	20-30	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			
99D2:													
Exira, moderately eroded---------------	50	0-6	28-34	1.25-1.35	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-40	25-35	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
		40-80	20-30	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			
99E2:													
Exira, moderately eroded---------------	45	0-6	28-34	1.25-1.35	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-40	25-35	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
		40-80	20-30	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			
100B:													
Monona----------------	75	0-7	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-4.0	.32	.32	5	7	38
		7-20	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32			
		20-48	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
		48-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
100C2:													
Monona, moderately eroded---------------	50	0-6	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		24-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
100D2:													
Monona, moderately eroded---------------	45	0-6	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		24-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
100D3:													
Monona, severely eroded---------------	45	0-7	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	1.0-2.0	.43	.43	4	7	38
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		24-36	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		36-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
100E2:													
Monona, moderately eroded---------------	45	0-6	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		24-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
100E3:													
Monona, severely eroded---------------	45	0-7	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	1.0-2.0	.43	.43	4	6	38
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		24-36	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		36-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
100F2:													
Monona, moderately eroded---------------	55	0-6	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		24-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
100F3:													
Monona, severely eroded---------------	70	0-7	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	1.0-2.0	.43	.43	4	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		24-36	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		36-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
111D3:													
Dow, severely eroded--	55	0-6	18-25	1.20-1.45	0.6-2	0.22-0.24	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		6-80	18-25	1.30-1.45	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
111D3:													
Monona, severely eroded---------------	40	0-7	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	1.0-2.0	.43	.43	4	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		24-36	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		36-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
111E3:													
Dow, severely eroded--	55	0-6	18-25	1.20-1.45	0.6-2	0.22-0.24	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		6-60	18-25	1.30-1.45	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
Monona, severely eroded---------------	40	0-7	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	1.0-2.0	.43	.43	4	4L	86
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		24-36	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.0	.43	.43			
		36-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
125D3:													
Ida, severely eroded--	50	0-3	18-27	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		3-80	18-25	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
Chute, severely eroded	30	0-4	5-10	1.45-1.66	6-20	0.11-0.13	0.0-2.9	1.0-2.0	.17	.17	5	2	134
		4-60	1-8	1.60-1.75	6-20	0.06-0.09	0.0-2.9	0.0-0.5	.15	.15			
125E3:													
Ida, severely eroded--	50	0-3	18-27	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43	4	4L	86
		3-80	18-25	1.20-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
Chute, severely eroded	30	0-4	5-10	1.45-1.66	6-20	0.11-0.13	0.0-2.9	1.0-2.0	.17	.17	5	2	134
		4-60	1-8	1.60-1.75	6-20	0.06-0.09	0.0-2.9	0.0-0.5	.15	.15			
133:													
Colo, occasionally flooded-------------	85	0-8	27-36	1.28-1.32	0.6-2	0.21-0.23	3.0-5.9	3.0-5.0	.28	.28	5	7	38
		8-34	27-36	1.28-1.32	0.6-2	0.21-0.23	3.0-5.9	3.0-5.0	.28	.28			
		34-51	30-35	1.25-1.35	0.6-2	0.18-0.20	3.0-5.9	3.0-4.0	.28	.28			
		51-60	25-35	1.35-1.45	0.6-2	0.18-0.20	3.0-5.9	1.0-2.0	.32	.32			
133+:													
Colo, overwash, occasionally flooded	85	0-8	25-35	1.35-1.45	0.6-2	0.18-0.20	3.0-5.9	2.0-5.0	.32	.32	5	6	38
		8-34	27-36	1.28-1.32	0.6-2	0.21-0.23	3.0-5.9	3.0-5.0	.28	.28			
		34-51	30-35	1.25-1.35	0.6-2	0.18-0.20	3.0-5.9	3.0-4.0	.28	.28			
		51-60	25-35	1.35-1.45	0.6-2	0.18-0.20	3.0-5.9	1.0-2.0	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
212:													
Kennebec, occasionally flooded-------------	70	0-8	22-26	1.25-1.35	0.6-2	0.22-0.24	3.0-5.9	2.0-4.0	.28	.28	5	6	48
		8-41	24-32	1.25-1.35	0.6-2	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28			
		41-54	24-32	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	5.0-6.0	.43	.43			
		54-80	24-30	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
212+:													
Kennebec, overwash, occasionally flooded	90	0-8	22-26	1.25-1.35	0.6-2	0.22-0.24	3.0-5.9	2.0-4.0	.28	.28	5	6	48
		8-41	24-32	1.25-1.35	0.6-2	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28			
		41-54	24-32	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	5.0-6.0	.43	.43			
		54-80	24-30	1.35-1.40	0.6-2	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
220:													
Nodaway, occasionally flooded-------------	75	0-7	18-27	1.25-1.35	0.6-2	0.20-0.23	0.0-2.9	2.0-4.0	.32	.32	5	6	48
		7-31	18-28	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
		31-42	18-30	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
		42-80	18-28	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
266:													
Smithland, occasionally flooded	85	0-7	27-36	1.28-1.32	0.6-2	0.21-0.23	3.0-5.9	5.0-7.0	.28	.28	5	7	38
		7-34	27-36	1.28-1.32	0.6-2	0.21-0.23	3.0-5.9	5.0-6.5	.28	.28			
		34-50	30-35	1.25-1.35	0.6-2	0.18-0.20	3.0-5.9	3.0-4.0	.28	.28			
		50-60	25-35	1.35-1.45	0.6-2	0.18-0.20	3.0-5.9	1.0-2.0	.32	.32			
266+:													
Smithland, overwash, occasionally flooded	75	0-8	25-36	1.28-1.32	0.6-2	0.21-0.23	3.0-5.9	2.0-4.0	.28	.28	5	7	38
		8-34	27-36	1.28-1.32	0.6-2	0.21-0.23	3.0-5.9	5.0-6.5	.28	.28			
		34-50	30-35	1.25-1.35	0.6-2	0.18-0.20	3.0-5.9	3.0-4.0	.28	.28			
		50-60	25-35	1.35-1.45	0.6-2	0.18-0.20	3.0-5.9	1.0-2.0	.32	.32			
268D:													
Knox------------------	85	0-7	18-27	1.20-1.30	0.6-2	0.22-0.24	0.0-2.9	1.0-3.0	.32	.32	5	6	48
		7-12	18-27	1.20-1.30	0.6-2	0.22-0.24	0.0-2.9	1.0-3.0	.32	.32			
		12-61	25-35	1.30-1.40	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
		61-70	18-27	1.20-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
268E:													
Knox------------------	80	0-7	18-27	1.20-1.30	0.6-2	0.22-0.24	0.0-2.9	1.0-3.0	.32	.32	5	6	48
		7-12	18-27	1.20-1.30	0.6-2	0.22-0.24	0.0-2.9	1.0-3.0	.32	.32			
		12-61	25-35	1.30-1.40	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
		61-70	18-27	1.20-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
268F:													
Knox------------------	75	0-7	18-27	1.20-1.30	0.6-2	0.22-0.24	0.0-2.9	1.0-3.0	.32	.32	5	6	48
		7-12	18-27	1.20-1.30	0.6-2	0.22-0.24	0.0-2.9	1.0-3.0	.32	.32			
		12-61	25-35	1.30-1.40	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
		61-70	18-27	1.20-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
430:													
Ackmore, occasionally flooded--------------	75	0-6	18-27	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-4.0	.32	.32	5	6	48
		6-25	18-30	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	1.0-3.0	.32	.32			
		25-60	26-38	1.30-1.40	0.2-0.6	0.18-0.20	6.0-8.9	3.0-5.0	.32	.32			
431B:													
Judson----------------	55	0-9	27-32	1.30-1.35	0.6-2	0.21-0.23	3.0-5.9	3.0-4.0	.28	.28	5	7	38
		9-28	30-35	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	3.0-3.5	.28	.28			
		28-52	25-32	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	1.0-2.0	.43	.43			
		52-60	25-32	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	0.5-1.0	.43	.43			
Ackmore, frequently flooded--------------	25	0-6	18-27	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-4.0	.32	.32	5	6	48
		6-25	18-30	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	1.0-3.0	.32	.32			
		25-60	26-38	1.30-1.40	0.6-2	0.18-0.20	6.0-8.9	3.0-5.0	.32	.32			
Colo, overwash, frequently flooded---	15	0-8	25-35	1.35-1.45	0.6-2	0.18-0.20	3.0-5.9	3.0-5.0	.32	.32	5	6	38
		8-34	27-36	1.28-1.32	0.6-2	0.21-0.23	3.0-5.9	3.0-5.0	.28	.28			
		34-51	30-35	1.25-1.35	0.6-2	0.18-0.20	3.0-5.9	3.0-4.0	.28	.28			
		51-60	25-35	1.35-1.45	0.6-2	0.18-0.20	3.0-5.9	1.0-2.0	.32	.32			
509B:													
Marshall, terrace-----	90	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28	5	6	48
		7-22	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28			
		22-65	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
		65-80	22-30	1.30-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			
509C:													
Marshall, terrace-----	85	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28	5	6	48
		7-22	27-35	1.25-1.30	0.6-2	0.21-0.23	0.0-2.9	3.0-4.0	.28	.28			
		22-65	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
		65-80	22-30	1.30-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
509C2:													
Marshall, terrace, moderately eroded----	65	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		7-47	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.32	.32			
		47-80	23-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
509D2:													
Marshall, terrace, moderately eroded----	65	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-47	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.32	.32			
		47-80	23-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
509E2:													
Marshall, terrace, moderately eroded----	65	0-7	27-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		7-47	27-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.5-1.0	.32	.32			
		47-80	23-34	1.30-1.35	0.6-2	0.18-0.20	3.0-5.9	0.0-1.0	.43	.43			
510:													
Monona, terrace-------	100	0-8	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-4.0	.28	.28	5	6	48
		8-15	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-3.5	.28	.28			
		15-30	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		30-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
510B:													
Monona, terrace-------	60	0-8	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-4.0	.28	.28	5	6	48
		8-15	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-3.5	.28	.28			
		15-30	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		30-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
510C2:													
Monona, terrace, moderately eroded----	75	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	4	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-1.5	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
510D2:													
Monona, terrace, moderately eroded----	75	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	4	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-1.5	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
510E2:													
Monona, terrace, moderately eroded----	75	0-7	20-27	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	6	48
		7-24	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	1.0-1.5	.43	.43			
		24-60	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
630:													
Danbury, occasionally flooded--------------	80	0-7	20-30	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	1.0-3.0	.32	.32	5	6	48
		7-32	18-35	1.25-1.30	0.6-2	0.21-0.23	3.0-5.9	1.0-2.5	.32	.32			
		32-64	26-40	1.30-1.40	0.2-0.6	0.18-0.20	6.0-8.9	3.0-4.0	.32	.32			
		64-80	26-38	1.30-1.40	0.2-0.6	0.18-0.20	6.0-8.9	2.0-3.0	.32	.32			
670:													
Rawles, occasionally flooded--------------	80	0-8	18-27	1.25-1.35	0.6-2	0.21-0.23	3.0-5.9	1.0-3.0	.32	.32	5	4L	86
		8-26	18-27	1.25-1.35	0.6-2	0.21-0.23	3.0-5.9	1.0-2.5	.32	.32			
		26-60	22-35	1.35-1.40	0.6-2	0.19-0.21	3.0-5.9	3.0-4.0	.32	.32			
700:													
Monona, terrace-------	100	0-6	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-4.0	.32	.32	5	7	38
		6-16	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-3.5	.32	.32			
		16-49	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		49-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
700B:													
Monona, terrace-------	75	0-6	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-4.0	.32	.32	5	7	38
		6-16	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	3.0-3.5	.32	.32			
		16-49	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		49-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
700C2:													
Monona, terrace, moderately eroded----	50	0-6	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-49	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		49-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
700D2:													
Monona, terrace, moderately eroded----	60	0-6	27-30	1.25-1.30	0.6-2	0.22-0.24	3.0-5.9	2.0-3.0	.32	.32	5	7	38
		6-49	24-28	1.30-1.35	0.6-2	0.20-0.22	3.0-5.9	0.5-1.5	.43	.43			
		49-80	18-24	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
717D:													
Napier----------------	50	0-8	20-27	1.20-1.25	0.6-2	0.22-0.24	0.0-2.9	3.0-4.0	.28	.28	5	6	48
		8-29	20-27	1.20-1.25	0.6-2	0.22-0.24	0.0-2.9	3.0-3.5	.28	.28			
		29-48	20-27	1.25-1.30	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43			
		48-60	20-27	1.25-1.30	0.6-2	0.20-0.22	0.0-2.9	0.0-0.5	.43	.43			
Gullied land, frequently flooded---	35	---	---	---	---	---	---	---	---	---	-	---	---
740D:													
Hawick----------------	90	0-7	2-10	1.50-1.65	2-20	0.03-0.13	0.0-2.9	1.0-3.0	.10	.15	3	3	86
		7-11	1-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
		11-80	1-5	1.55-1.65	20-101	0.02-0.06	0.0-2.9	0.0-0.5	.10	.15			
740E:													
Hawick----------------	90	0-7	2-10	1.50-1.65	2-20	0.03-0.13	0.0-2.9	1.0-3.0	.10	.15	3	3	86
		7-11	1-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
		11-80	1-5	1.55-1.65	20-101	0.02-0.06	0.0-2.9	0.0-0.5	.10	.15			
740F:													
Hawick----------------	90	0-7	2-10	1.50-1.65	2-20	0.03-0.13	0.0-2.9	1.0-3.0	.10	.15	3	3	86
		7-11	1-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
		11-80	1-5	1.55-1.65	20-101	0.02-0.06	0.0-2.9	0.0-0.5	.10	.15			
980C:													
Judson----------------	55	0-9	27-32	1.30-1.35	0.6-2	0.21-0.23	3.0-5.9	3.0-4.0	.28	.28	5	7	38
		9-28	27-32	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	3.0-3.5	.28	.28			
		28-52	25-35	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	1.0-2.0	.43	.43			
		52-60	25-32	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	0.5-1.0	.43	.43			
Gullied land, frequently flooded---	35	---	---	---	---	---	---	---	---	---	-	---	---
1220:													
Nodaway, channeled, frequently flooded---	80	0-7	18-27	1.25-1.35	0.6-2	0.20-0.23	0.0-2.9	2.0-4.0	.32	.32	5	6	48
		7-31	18-28	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
		31-42	18-30	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
		42-80	18-28	1.25-1.35	0.6-2	0.20-0.23	3.0-5.9	0.5-1.0	.43	.43			
5010.													
Pits, sand and gravel													
5040.													
Udorthents													

Physical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
									Kw	Kf	T		
		In	Pct	g/cc	In/hr	In/in	Pct	Pct					
5080. Udorthents													
AW. Animal waste lagoon													
SL. Sewage lagoon													
W. Water													

Chemical Properties

The table described in this section shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
1C:					
Ida------------------	95	0-8	20-25	6.6-8.4	0-25
		8-60	20-25	7.4-8.4	5-30
1C3:					
Ida, severely eroded	80	0-3	20-25	6.6-8.4	0-25
		3-80	20-25	7.4-8.4	5-30
1D3:					
Ida, severely eroded	80	0-3	20-25	6.6-8.4	0-25
		3-80	20-25	7.4-8.4	5-30
1E3:					
Ida, severely eroded	70	0-3	20-25	6.6-8.4	0-25
		3-80	20-25	7.4-8.4	5-30
1F3:					
Ida, severely eroded	70	0-3	20-25	6.6-8.4	0-25
		3-80	20-25	7.4-8.4	5-30
8B:					
Judson---------------	80	0-9	25-30	5.6-7.3	0
		9-28	25-30	5.6-7.3	0
		28-52	25-30	6.1-7.8	0-15
		52-60	25-30	6.1-7.8	0-15
8C:					
Judson---------------	95	0-9	25-30	5.6-7.3	0
		9-28	25-30	5.6-7.3	0
		28-52	25-30	6.1-7.8	0-15
		52-60	25-30	6.1-7.8	0-15
9:					
Marshall-------------	95	0-7	25-30	5.6-7.3	0
		7-22	25-30	5.6-7.3	0
		22-65	25-30	5.6-7.3	0
		65-80	20-25	6.6-7.3	0
9B:					
Marshall-------------	100	0-7	25-30	5.6-7.3	0
		7-22	25-30	5.6-7.3	0
		22-65	25-30	5.6-7.3	0
		65-80	20-25	6.6-7.3	0
9B2:					
Marshall, moderately eroded--------------	85	0-7	25-30	5.6-7.3	0
		7-47	25-30	5.6-7.3	0
		47-80	25-30	5.6-7.3	0
9C:					
Marshall-------------	90	0-7	25-30	5.6-7.3	0
		7-22	25-30	5.6-7.3	0
		22-65	25-30	5.6-7.3	0
		65-80	20-25	6.6-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
9C2:					
Marshall, moderately eroded	80	0-7	25-30	5.6-7.3	0
		7-47	25-30	5.6-7.3	0
		47-80	25-30	5.6-7.3	0
9D:					
Marshall	85	0-7	25-30	5.6-7.3	0
		7-22	25-30	5.6-7.3	0
		22-65	25-30	5.6-7.3	0
		65-80	20-25	6.6-7.3	0
9D2:					
Marshall, moderately eroded	70	0-7	25-30	5.6-7.3	0
		7-47	25-30	5.6-7.3	0
		47-80	25-30	5.6-7.3	0
9E2:					
Marshall, moderately eroded	70	0-7	25-30	5.6-7.3	0
		7-47	25-30	5.6-7.3	0
		47-80	25-30	5.6-7.3	0
9E3:					
Marshall, severely eroded	75	0-5	25-30	5.6-7.3	0
		5-46	25-30	5.6-7.3	0
		46-68	25-30	5.6-7.3	0
10B:					
Monona	100	0-8	25-30	5.6-7.3	0
		8-15	25-30	5.6-7.3	0
		15-30	25-30	6.1-7.3	0
		30-60	20-25	6.6-8.4	0-25
10B2:					
Monona, moderately eroded	80	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
10C2:					
Monona, moderately eroded	75	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
10D2:					
Monona, moderately eroded	60	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
10D3:					
Monona, severely eroded	95	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate
		In	meq/100 g	pH	Pct
10E2:					
Monona, moderately eroded	50	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
10E3:					
Monona, severely eroded	60	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
10F2:					
Monona, moderately eroded	45	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
10F3:					
Monona, severely eroded	70	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
12B:					
Napier	85	0-8	20-25	6.1-7.3	0
		8-29	20-25	6.1-7.3	0
		29-48	20-25	6.1-8.4	0-10
		48-60	20-25	6.6-8.4	0-10
12C:					
Napier	95	0-8	20-25	6.1-7.3	0
		8-29	20-25	6.1-7.3	0
		29-48	20-25	6.1-8.4	0-10
		48-60	20-25	6.6-8.4	0-10
17B:					
Napier	50	0-8	20-25	6.1-7.3	0
		8-29	20-25	6.1-7.3	0
		29-48	20-25	6.1-8.4	0-10
		48-60	20-25	6.6-8.4	0-10
Kennebec, frequently flooded	20	0-8	30-36	5.6-7.3	0
		8-41	30-36	5.6-7.3	0
		41-54	30-36	6.1-7.3	0
		54-80	30-36	6.1-7.3	0
Nodaway, frequently flooded	15	0-7	20-25	6.1-7.3	0
		7-31	20-25	6.1-7.3	0
		31-42	20-25	6.1-7.3	0
		42-80	20-25	6.1-7.3	0
22D2:					
Dow, moderately eroded	90	0-6	20-25	6.6-8.4	0-25
		6-80	20-25	7.9-8.4	15-30

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
22D3:					
Dow, severely eroded	90	0-6	20-25	6.6-8.4	0-25
		6-80	20-25	7.9-8.4	15-30
22E3:					
Dow, severely eroded	80	0-6	20-25	6.6-8.4	0-25
		6-80	20-25	7.9-8.4	15-30
26:					
Kennebec, occasionally flooded	95	0-8	30-36	5.6-7.3	0
		8-41	30-36	5.6-7.3	0
		41-54	30-36	6.1-7.3	0
		54-80	30-36	6.1-7.3	0
35D2:					
Liston, moderately eroded--------------	50	0-5	25-30	7.4-8.4	0-15
		5-38	22-27	7.4-8.4	5-20
		38-80	20-31	7.4-8.4	5-20
Burchard, moderately eroded--------------	35	0-5	15-25	5.6-7.3	0
		5-13	15-25	6.1-7.3	0
		13-37	15-25	7.4-8.4	5-10
		37-80	10-20	7.4-8.4	1-15
35E2:					
Liston, moderately eroded--------------	50	0-5	25-30	7.4-8.4	0-15
		5-38	22-27	7.4-8.4	5-20
		38-80	20-31	7.4-8.4	5-20
Burchard, moderately eroded--------------	35	0-5	15-25	5.6-7.3	0
		5-13	15-25	6.1-7.3	0
		13-37	15-25	7.4-8.4	5-10
		37-80	10-20	7.4-8.4	1-15
35F2:					
Liston, moderately eroded--------------	40	0-5	25-30	7.4-8.4	0-15
		5-38	22-27	7.4-8.4	5-20
		38-80	20-31	7.4-8.4	5-20
Burchard, moderately eroded--------------	30	0-5	15-25	5.6-7.3	0
		5-13	15-25	6.1-7.3	0
		13-37	15-25	7.4-8.4	5-10
		37-80	10-20	7.4-8.4	1-15
35G:					
Liston---------------	45	0-5	25-30	7.4-8.4	0-15
		5-38	22-27	7.4-8.4	5-20
		38-80	20-31	7.4-8.4	5-20
Burchard-------------	35	0-11	15-25	5.6-7.3	0
		11-24	15-25	6.1-7.3	0
		24-36	15-25	7.4-8.4	5-10
		36-60	10-20	7.4-8.4	1-15

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
54:					
Zook, occasionally flooded-------------	90	0-6	36-41	5.6-7.8	0
		6-20	36-41	5.6-7.3	0
		20-52	36-41	6.1-7.3	0
		52-60	30-36	6.1-7.3	0
54+:					
Zook, overwash, occasionally flooded	90	0-6	36-41	5.6-7.8	0
		6-20	36-41	5.6-7.3	0
		20-52	36-41	6.1-7.3	0
		52-60	30-36	6.1-7.3	0
59D2:					
Burchard, moderately eroded--------------	55	0-5	15-25	5.6-7.3	0
		5-13	15-25	6.1-7.3	0
		13-37	15-25	7.4-8.4	5-10
		37-80	10-20	7.4-8.4	1-15
59E2:					
Burchard, moderately eroded--------------	55	0-5	15-25	5.6-7.3	0
		5-13	15-25	6.1-7.3	0
		13-37	15-25	7.4-8.4	5-10
		37-80	10-20	7.4-8.4	1-15
99C2:					
Exira, moderately eroded--------------	80	0-6	28-34	5.6-6.5	0
		6-40	28-34	5.6-6.5	0
		40-80	28-34	6.1-7.3	0
99D2:					
Exira, moderately eroded--------------	50	0-6	28-34	5.6-6.5	0
		6-40	28-34	5.6-6.5	0
		40-80	28-34	6.1-7.3	0
99E2:					
Exira, moderately eroded--------------	45	0-6	28-34	5.6-6.5	0
		6-40	28-34	5.6-6.5	0
		40-80	28-34	6.1-7.3	0
100B:					
Monona---------------	75	0-7	25-30	5.6-7.3	0
		7-20	25-30	5.6-7.3	0
		20-48	25-30	6.1-7.3	0
		48-80	25-30	6.6-8.4	0-25
100C2:					
Monona, moderately eroded--------------	50	0-6	25-30	5.6-7.3	0
		6-24	25-30	6.1-7.3	0
		24-80	25-30	6.6-8.4	0-25

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
100D2:					
Monona, moderately eroded	45	0-6	25-30	5.6-7.3	0
		6-24	25-30	6.1-7.3	0
		24-80	25-30	6.6-8.4	0-25
100D3:					
Monona, severely eroded	45	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-36	25-30	6.1-7.3	0
		36-80	20-25	6.6-8.4	0-25
100E2:					
Monona, moderately eroded	45	0-6	25-30	5.6-7.3	0
		6-24	25-30	6.1-7.3	0
		24-80	25-30	6.6-8.4	0-25
100E3:					
Monona, severely eroded	45	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-36	25-30	6.1-7.3	0
		36-80	20-25	6.6-8.4	0-25
100F2:					
Monona, moderately eroded	55	0-6	25-30	5.6-7.3	0
		6-24	25-30	6.1-7.3	0
		24-80	25-30	6.6-8.4	0-25
100F3:					
Monona, severely eroded	70	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-36	25-30	6.1-7.3	0
		36-80	20-25	6.6-8.4	0-25
111D3:					
Dow, severely eroded	55	0-6	20-25	6.6-8.4	0-25
		6-80	20-25	7.9-8.4	15-30
Monona, severely eroded	40	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-36	25-30	6.1-7.3	0
		36-80	20-25	6.6-8.4	0-25
111E3:					
Dow, severely eroded	55	0-6	20-25	6.6-8.4	0-25
		6-60	20-25	7.9-8.4	15-30
Monona, severely eroded	40	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-36	25-30	6.1-7.3	0
		36-80	20-25	6.6-8.4	0-25

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
125D3:					
Ida, severely eroded	50	0-3	20-25	6.6-8.4	0-25
		3-80	20-25	7.4-8.4	5-30
Chute, severely eroded--------------	30	0-4	5.0-10	7.6-8.4	0-20
		4-60	1.0-6.0	7.4-8.4	10-30
125E3:					
Ida, severely eroded	50	0-3	20-25	6.6-8.4	0-25
		3-80	20-25	7.4-8.4	5-30
Chute, severely eroded--------------	30	0-4	5.0-10	7.6-8.4	0-20
		4-60	1.0-6.0	7.4-8.4	10-30
133:					
Colo, occasionally flooded-------------	85	0-8	36-41	5.6-7.3	0
		8-34	36-41	5.6-7.3	0
		34-51	36-41	5.6-7.3	0
		51-60	30-36	6.1-7.3	0
133+:					
Colo, overwash, occasionally flooded	85	0-8	30-36	6.1-7.3	0
		8-34	36-41	5.6-7.3	0
		34-51	36-41	5.6-7.3	0
		51-60	30-36	6.1-7.3	0
212:					
Kennebec, occasionally flooded	70	0-8	30-36	5.6-7.3	0
		8-41	30-36	5.6-7.3	0
		41-54	30-36	6.1-7.3	0
		54-80	30-36	6.1-7.3	0
212+:					
Kennebec, overwash, occasionally flooded	90	0-8	30-36	5.6-7.3	0
		8-41	30-36	5.6-7.3	0
		41-54	30-36	6.1-7.3	0
		54-80	30-36	6.1-7.3	0
220:					
Nodaway, occasionally flooded-------------	75	0-7	20-25	6.1-7.3	0
		7-31	20-25	6.1-7.3	0
		31-42	20-25	6.1-7.3	0
		42-80	20-25	6.1-7.3	0
266:					
Smithland, occasionally flooded	85	0-7	36-41	5.6-7.3	0
		7-34	36-41	5.6-7.3	0
		34-50	36-41	5.6-7.3	0
		50-60	30-36	6.1-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
266+:					
Smithland, overwash, occasionally flooded	75	0-8	36-41	5.6-7.3	0
		8-34	36-41	5.6-7.3	0
		34-50	36-41	5.6-7.3	0
		50-60	30-36	6.1-7.3	0
268D:					
Knox-----------------	85	0-7	10-18	5.6-7.3	0
		7-12	10-18	5.6-7.3	0
		12-61	12-22	5.6-7.3	0
		61-70	8.0-16	6.1-7.3	0
268E:					
Knox-----------------	80	0-7	10-18	5.6-7.3	0
		7-12	10-18	5.6-7.3	0
		12-61	12-22	5.6-7.3	0
		61-70	8.0-16	6.1-7.3	0
268F:					
Knox-----------------	75	0-7	10-18	5.6-7.3	0
		7-12	10-18	5.6-7.3	0
		12-61	12-22	5.6-7.3	0
		61-70	8.0-16	6.1-7.3	0
430:					
Ackmore, occasionally flooded-------------	75	0-6	25-30	5.6-7.3	0
		6-25	25-30	5.6-7.3	0
		25-60	25-30	5.6-7.8	5-10
431B:					
Judson---------------	55	0-9	25-30	5.6-7.3	0
		9-28	25-30	5.6-7.3	0
		28-52	25-30	6.1-7.8	0-15
		52-60	25-30	6.1-7.8	0-15
Ackmore, frequently flooded-------------	25	0-6	25-30	5.6-7.3	0
		6-25	25-30	5.6-7.3	0
		25-60	25-30	5.6-7.8	5-10
Colo, overwash, frequently flooded--	15	0-8	30-36	6.1-7.3	0
		8-34	36-41	5.6-7.3	0
		34-51	36-41	5.6-7.3	0
		51-60	30-36	6.1-7.3	0
509B:					
Marshall, terrace----	90	0-7	25-30	5.6-7.3	0
		7-22	25-30	5.6-7.3	0
		22-65	25-30	5.6-7.3	0
		65-80	20-25	6.6-7.3	0
509C:					
Marshall, terrace----	85	0-7	25-30	5.6-7.3	0
		7-22	25-30	5.6-7.3	0
		22-65	25-30	5.6-7.3	0
		65-80	20-25	6.6-7.3	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
509C2:					
Marshall, terrace, moderately eroded---	65	0-7	25-30	5.6-7.3	0
		7-47	25-30	5.6-7.3	0
		47-80	25-30	5.6-7.3	0
509D2:					
Marshall, terrace, moderately eroded---	65	0-7	25-30	5.6-7.3	0
		7-47	25-30	5.6-7.3	0
		47-80	25-30	5.6-7.3	0
509E2:					
Marshall, terrace, moderately eroded---	65	0-7	25-30	5.6-7.3	0
		7-47	25-30	5.6-7.3	0
		47-80	25-30	5.6-7.3	0
510:					
Monona, terrace------	100	0-8	25-30	5.6-7.3	0
		8-15	25-30	5.6-7.3	0
		15-30	25-30	6.1-7.3	0
		30-60	20-25	6.6-8.4	0-25
510B:					
Monona, terrace------	60	0-8	25-30	5.6-7.3	0
		8-15	25-30	5.6-7.3	0
		15-30	25-30	6.1-7.3	0
		30-60	20-25	6.6-8.4	0-25
510C2:					
Monona, terrace, moderately eroded---	75	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
510D2:					
Monona, terrace, moderately eroded---	75	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
510E2:					
Monona, terrace, moderately eroded---	75	0-7	25-30	5.6-7.3	0
		7-24	25-30	6.1-7.3	0
		24-60	20-25	6.6-8.4	0-25
630:					
Danbury, occasionally flooded------------	80	0-7	25-30	5.6-7.3	0
		7-32	25-30	5.6-7.3	0
		32-64	25-30	6.1-7.3	5-10
		64-80	25-30	5.6-7.3	5-10
670:					
Rawles, occasionally flooded------------	80	0-8	15-20	6.6-8.4	0-30
		8-26	15-20	6.6-8.4	0-30
		26-60	15-20	6.1-7.8	0-20

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
700:					
Monona, terrace------	100	0-6	25-30	5.6-7.3	0
		6-16	25-30	5.6-7.3	0
		16-49	25-30	6.1-7.3	0
		49-80	25-30	6.6-8.4	0-25
700B:					
Monona, terrace------	75	0-6	25-30	5.6-7.3	0
		6-16	25-30	5.6-7.3	0
		16-49	25-30	6.1-7.3	0
		49-80	25-30	6.6-8.4	0-25
700C2:					
Monona, terrace, moderately eroded---	50	0-6	25-30	5.6-7.3	0
		6-49	25-30	6.1-7.3	0
		49-80	25-30	6.6-8.4	0-25
700D2:					
Monona, terrace, moderately eroded---	60	0-6	25-30	5.6-7.3	0
		6-49	25-30	6.1-7.3	0
		49-80	25-30	6.6-8.4	0-25
717D:					
Napier---------------	50	0-8	20-25	6.1-7.3	0
		8-29	20-25	6.1-7.3	0
		29-48	20-25	6.1-8.4	0-10
		48-60	20-25	6.6-8.4	0-10
Gullied land, frequently flooded--	35	---	---	---	---
740D:					
Hawick---------------	90	0-7	1.0-10	6.1-7.8	0-10
		7-11	1.0-5.0	6.1-7.8	0-10
		11-80	1.0-5.0	7.4-8.4	5-15
740E:					
Hawick---------------	90	0-7	1.0-10	6.1-7.8	0-10
		7-11	1.0-5.0	6.1-7.8	0-10
		11-80	1.0-5.0	7.4-8.4	5-15
740F:					
Hawick---------------	90	0-7	1.0-10	6.1-7.8	0-10
		7-11	1.0-5.0	6.1-7.8	0-10
		11-80	1.0-5.0	7.4-8.4	5-15
980C:					
Judson---------------	55	0-9	25-30	5.6-7.3	0
		9-28	25-30	5.6-7.3	0
		28-52	25-30	6.1-7.8	0-15
		52-60	25-30	6.1-7.8	0-15
Gullied land, frequently flooded--	35	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Pct. of map unit	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate
		In	meq/100 g	pH	Pct
1220:					
Nodaway, channeled, frequently flooded--	80	0-7	20-25	6.1-7.3	0
		7-31	20-25	6.1-7.3	0
		31-42	20-25	6.1-7.3	0
		42-80	20-25	6.1-7.3	0
5010. Pits, sand and gravel					
5040. Udorthents					
5080. Udorthents					
AW. Animal waste lagoon					
SL. Sewage lagoon					
W. Water					

Water Features

The table described in this section gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are *negligible, very low, low, medium, high,* and *very high*.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall

or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
1C:										
Ida------------------------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
1C3:										
Ida, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
1D3:										
Ida, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
1E3:										
Ida, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
1F3:										
Ida, severely eroded------	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
8B:										
Judson--------------------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
8C:										
Judson--------------------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
9:										
Marshall------------------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
9B:										
Marshall	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
9B2:										
Marshall, moderately eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
9C:										
Marshall	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
9C2:										
Marshall, moderately eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
9D:										
Marshall	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
9D2:										
Marshall, moderately eroded-------------------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
9E2:										
Marshall, moderately eroded-------------------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
9E3:										
Marshall, severely eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
10B:										
Monona--------------------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
10B2:										
Monona, moderately eroded	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
10C2:										
Monona, moderately eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
10D2:										
Monona, moderately eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
10D3:										
Monona, severely eroded---	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
10E2:										
Monona, moderately eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
10E3:										
Monona, severely eroded---	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
10F2:										
Monona, moderately eroded	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
10F3:										
Monona, severely eroded---	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
12B:										
Napier--------------------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
12C:										
Napier--------------------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
17B:										
Napier--------------------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Kennebec, frequently flooded------------------	B	Low								
			January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Very brief	Frequent
			March	4.5-6.5	>6.0	---	---	None	Very brief	Frequent
			April	4.0-6.0	>6.0	---	---	None	Very brief	Frequent
			May	4.5-6.5	>6.0	---	---	None	Very brief	Frequent
			June	5.0-6.7	>6.0	---	---	None	Very brief	Frequent
			July	6.0-6.7	>6.0	---	---	None	Very brief	Frequent
			August	6.5-6.7	>6.0	---	---	None	Very brief	Frequent
			September	---	---	---	---	None	Very brief	Frequent
			October	6.5-6.7	>6.0	---	---	None	Very brief	Frequent
			November	5.5-6.7	>6.0	---	---	None	Very brief	Frequent
			December	6.0-6.7	>6.0	---	---	None	---	None
Nodaway, frequently flooded------------------	B	Low								
			January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Very brief	Frequent
			March	4.5-6.5	>6.0	---	---	None	Very brief	Frequent
			April	4.0-6.0	>6.0	---	---	None	Very brief	Frequent
			May	4.5-6.5	>6.0	---	---	None	Very brief	Frequent
			June	5.0-6.7	>6.0	---	---	None	Very brief	Frequent
			July	6.0-6.7	>6.0	---	---	None	Very brief	Frequent
			August	6.5-6.7	>6.0	---	---	None	Very brief	Frequent
			September	---	---	---	---	None	Very brief	Frequent
			October	6.5-6.7	>6.0	---	---	None	Very brief	Frequent
			November	5.5-6.7	>6.0	---	---	None	Very brief	Frequent
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
22D2:										
Dow, moderately eroded----	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
22D3:										
Dow, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
22E3:										
Dow, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
26:										
Kennebec, occasionally flooded------------------	B	Low								
			January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
			May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
			July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
			August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			September	---	---	---	---	None	Brief	Occasional
			October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			December	6.0-6.7	>6.0	---	---	None	---	None
35D2:										
Liston, moderately eroded	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Burchard, moderately eroded-------------------	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
35E2:										
Liston, moderately eroded	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Burchard, moderately eroded-------------------	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
35F2:										
Liston, moderately eroded	B	Very high								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
35F2:										
Burchard, moderately eroded-------------------	B	Very high								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
35G:										
Liston--------------------	B	Very high								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Burchard------------------	B	Very high								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
54:										
Zook, occasionally flooded	C/D	Medium								
			January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
			May	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
			July	2.0-3.5	>6.0	---	---	None	Brief	Occasional
			August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
			October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			December	2.0-3.5	>6.0	---	---	None	---	None
54+:										
Zook, overwash, occasionally flooded-----	C/D	Medium								
			January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
			May	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
			July	2.0-3.5	>6.0	---	---	None	Brief	Occasional
			August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
			October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			December	2.0-3.5	>6.0	---	---	None	---	None
59D2:										
Burchard, moderately eroded-------------------	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
59E2:										
Burchard, moderately eroded-------------------	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
99C2:										
Exira, moderately eroded--	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
99D2:										
Exira, moderately eroded--	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
99E2:										
Exira, moderately eroded--	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
100B:										
Monona--------------------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
100C2:										
Monona, moderately eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
100D2:										
Monona, moderately eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
100D3:										
Monona, severely eroded---	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
100E2:										
Monona, moderately eroded	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
100E3:										
Monona, severely eroded---	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
100F2:										
Monona, moderately eroded	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
100F3:										
Monona, severely eroded---	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
111D3:										
Dow, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Monona, severely eroded---	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
111E3:										
Dow, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
111E3:										
Monona, severely eroded---	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
125D3:										
Ida, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Chute, severely eroded----	A	Very low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
125E3:										
Ida, severely eroded------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Chute, severely eroded----	A	Very low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
133:										
Colo, occasionally flooded	B/D	Low								
			January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
			May	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
			July	2.0-3.5	>6.0	---	---	None	Brief	Occasional
			August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
			October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
133+:										
Colo, overwash, occasionally flooded-----	B/D	Low								
			January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
			May	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
			July	2.0-3.5	>6.0	---	---	None	Brief	Occasional
			August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
			October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			December	2.0-3.5	>6.0	---	---	None	---	None
212:										
Kennebec, occasionally flooded------------------	B	Low								
			January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
			May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
			July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
			August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			September	---	---	---	---	None	Brief	Occasional
			October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
212+:										
Kennebec, overwash, occasionally flooded-----	B	Low								
			January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
			May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
			July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
			August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			September	---	---	---	---	None	Brief	Occasional
			October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			December	6.0-6.7	>6.0	---	---	None	---	None
220:										
Nodaway, occasionally flooded------------------	B	Low								
			January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
			May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
			July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
			August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			September	---	---	---	---	None	Brief	Occasional
			October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
266:										
Smithland, occasionally flooded	B/D	Low								
			January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	Brief	Occasional
			March	1.5-4.0	>6.0	---	---	None	Brief	Occasional
			April	1.0-3.5	>6.0	---	---	None	Brief	Occasional
			May	1.5-4.0	>6.0	---	---	None	Brief	Occasional
			June	2.0-4.5	>6.0	---	---	None	Brief	Occasional
			July	3.0-5.5	>6.0	---	---	None	Brief	Occasional
			August	3.5-6.0	>6.0	---	---	None	Brief	Occasional
			September	4.0-6.5	>6.0	---	---	None	Brief	Occasional
			October	3.5-6.0	>6.0	---	---	None	Brief	Occasional
			November	2.5-5.0	>6.0	---	---	None	Brief	Occasional
			December	3.0-5.5	>6.0	---	---	None	---	None
266+:										
Smithland, overwash, occasionally flooded	B/D	Low								
			January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	Brief	Occasional
			March	1.5-4.0	>6.0	---	---	None	Brief	Occasional
			April	1.0-3.5	>6.0	---	---	None	Brief	Occasional
			May	1.5-4.0	>6.0	---	---	None	Brief	Occasional
			June	2.0-4.5	>6.0	---	---	None	Brief	Occasional
			July	3.0-5.5	>6.0	---	---	None	Brief	Occasional
			August	3.5-6.0	>6.0	---	---	None	Brief	Occasional
			September	4.0-6.5	>6.0	---	---	None	Brief	Occasional
			October	3.5-6.0	>6.0	---	---	None	Brief	Occasional
			November	2.5-5.0	>6.0	---	---	None	Brief	Occasional
			December	3.0-5.5	>6.0	---	---	None	---	None
268D:										
Knox	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
268E:										
Knox	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
268F:										
Knox	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
430:										
Ackmore, occasionally flooded	B	Low								
			January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	Brief	Occasional
			March	1.5-4.0	>6.0	---	---	None	Brief	Occasional
			April	1.0-3.5	>6.0	---	---	None	Brief	Occasional
			May	1.5-4.0	>6.0	---	---	None	Brief	Occasional
			June	2.0-4.5	>6.0	---	---	None	Brief	Occasional
			July	3.0-5.5	>6.0	---	---	None	Brief	Occasional
			August	3.5-6.0	>6.0	---	---	None	Brief	Occasional
			September	4.0-6.5	>6.0	---	---	None	Brief	Occasional
			October	3.5-6.0	>6.0	---	---	None	Brief	Occasional
			November	2.5-5.0	>6.0	---	---	None	Brief	Occasional
			December	3.0-5.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
431B:										
Judson--------------------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Ackmore, frequently flooded------------------	B	Low								
			January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	Very brief	Frequent
			March	1.5-4.0	>6.0	---	---	None	Very brief	Frequent
			April	1.0-3.5	>6.0	---	---	None	Very brief	Frequent
			May	1.5-4.0	>6.0	---	---	None	Very brief	Frequent
			June	2.0-4.5	>6.0	---	---	None	Very brief	Frequent
			July	3.0-5.5	>6.0	---	---	None	Very brief	Frequent
			August	3.5-6.0	>6.0	---	---	None	Very brief	Frequent
			September	4.0-6.5	>6.0	---	---	None	Very brief	Frequent
			October	3.5-6.0	>6.0	---	---	None	Very brief	Frequent
			November	2.5-5.0	>6.0	---	---	None	Very brief	Frequent
			December	3.0-5.5	>6.0	---	---	None	---	None
Colo, overwash, frequently flooded------------------	B/D	Low								
			January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
			March	0.5-2.0	>6.0	---	---	None	Very brief	Frequent
			April	0.0-1.0	>6.0	---	---	None	Very brief	Frequent
			May	0.5-2.0	>6.0	---	---	None	Very brief	Frequent
			June	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
			July	2.0-3.5	>6.0	---	---	None	Very brief	Frequent
			August	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
			September	3.0-4.0	>6.0	---	---	None	Very brief	Frequent
			October	2.5-3.5	>6.0	---	---	None	Very brief	Frequent
			November	1.5-3.0	>6.0	---	---	None	Very brief	Frequent
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
509B:										
Marshall, terrace---------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
509C:										
Marshall, terrace---------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
509C2:										
Marshall, terrace, moderately eroded--------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
509D2:										
Marshall, terrace, moderately eroded--------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
509E2:										
Marshall, terrace, moderately eroded--------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
510:										
Monona, terrace-----------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
510B:										
Monona, terrace-----------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
510C2:										
Monona, terrace, moderately eroded--------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
510D2:										
Monona, terrace, moderately eroded--------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
510E2:										
Monona, terrace, moderately eroded--------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
630:										
Danbury, occasionally flooded------------------	B	Low								
			January	4.0-6.0	>6.0	---	---	None	---	None
			February	3.5-5.5	>6.0	---	---	None	Brief	Occasional
			March	2.5-4.5	>6.0	---	---	None	Brief	Occasional
			April	2.0-4.0	>6.0	---	---	None	Brief	Occasional
			May	2.5-4.5	>6.0	---	---	None	Brief	Occasional
			June	3.0-5.0	>6.0	---	---	None	Brief	Occasional
			July	4.0-6.0	>6.0	---	---	None	Brief	Occasional
			August	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			September	5.0-6.7	>6.0	---	---	None	Brief	Occasional
			October	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			November	3.5-5.5	>6.0	---	---	None	Brief	Occasional
			December	4.0-6.0	>6.0	---	---	None	---	None
670:										
Rawles, occasionally flooded------------------	B	Low								
			January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
			May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
			July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
			August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			September	---	---	---	---	None	Brief	Occasional
			October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
700:										
Monona, terrace-----------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
700B:										
Monona, terrace-----------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
700C2:										
Monona, terrace, moderately eroded--------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
700D2:										
Monona, terrace, moderately eroded--------	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
717D:										
Napier--------------------	B	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Gullied land, frequently flooded-----------------	---	---								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	Very brief	Frequent
			March	---	---	---	---	None	Very brief	Frequent
			April	---	---	---	---	None	Very brief	Frequent
			May	---	---	---	---	None	Very brief	Frequent
			June	---	---	---	---	None	Very brief	Frequent
			July	---	---	---	---	None	Very brief	Frequent
			August	---	---	---	---	None	Very brief	Frequent
			September	---	---	---	---	None	Very brief	Frequent
			October	---	---	---	---	None	Very brief	Frequent
			November	---	---	---	---	None	Very brief	Frequent
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
740D:										
Hawick--------------------	A	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
740E:										
Hawick--------------------	A	Low								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
740F:										
Hawick--------------------	A	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
980C:										
Judson	B	Medium								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Gullied land, frequently flooded	---	---								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	Very brief	Frequent
			March	---	---	---	---	None	Very brief	Frequent
			April	---	---	---	---	None	Very brief	Frequent
			May	---	---	---	---	None	Very brief	Frequent
			June	---	---	---	---	None	Very brief	Frequent
			July	---	---	---	---	None	Very brief	Frequent
			August	---	---	---	---	None	Very brief	Frequent
			September	---	---	---	---	None	Very brief	Frequent
			October	---	---	---	---	None	Very brief	Frequent
			November	---	---	---	---	None	Very brief	Frequent
			December	---	---	---	---	None	---	None
1220:										
Nodaway, channeled, frequently flooded	B	Low								
			January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Brief	Frequent
			March	4.5-6.5	>6.0	---	---	None	Brief	Frequent
			April	4.0-6.0	>6.0	---	---	None	Brief	Frequent
			May	4.5-6.5	>6.0	---	---	None	Brief	Frequent
			June	5.0-6.7	>6.0	---	---	None	Brief	Frequent
			July	6.0-6.7	>6.0	---	---	None	Brief	Frequent
			August	6.5-6.7	>6.0	---	---	None	Brief	Frequent
			September	---	---	---	---	None	Brief	Frequent
			October	6.5-6.7	>6.0	---	---	None	Brief	Frequent
			November	5.5-6.7	>6.0	---	---	None	Brief	Frequent
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
5010. Pits, sand and gravel										
5040. Udorthents										
5080. Udorthents										
AW. Animal waste lagoon										
SL. Sewage lagoon										
W. Water										

Soil Features

The table described in this section gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
1C:			
Ida	High	Low	Low
1C3:			
Ida, severely eroded	High	Low	Low
1D3:			
Ida, severely eroded	High	Low	Low
1E3:			
Ida, severely eroded	High	Low	Low
1F3:			
Ida, severely eroded	High	Low	Low
8B:			
Judson	High	Moderate	Low
8C:			
Judson	High	Moderate	Low
9:			
Marshall	High	Moderate	Moderate
9B:			
Marshall	High	Moderate	Moderate
9B2:			
Marshall, moderately eroded	High	Moderate	Moderate
9C:			
Marshall	High	Moderate	Moderate
9C2:			
Marshall, moderately eroded	High	Moderate	Moderate
9D:			
Marshall	High	Moderate	Moderate
9D2:			
Marshall, moderately eroded	High	Moderate	Moderate
9E2:			
Marshall, moderately eroded	High	Moderate	Moderate
9E3:			
Marshall, severely eroded	High	Moderate	Moderate
10B:			
Monona	High	Low	Low

Soil Features--Continued

Map symbol and soil name	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
10B2:			
Monona, moderately eroded	High	Low	Low
10C2:			
Monona, moderately eroded	High	Low	Low
10D2:			
Monona, moderately eroded	High	Low	Low
10D3:			
Monona, severely eroded	High	Low	Low
10E2:			
Monona, moderately eroded	High	Low	Low
10E3:			
Monona, severely eroded	High	Low	Low
10F2:			
Monona, moderately eroded	High	Low	Low
10F3:			
Monona, severely eroded	High	Low	Low
12B:			
Napier	High	Low	Low
12C:			
Napier	High	Low	Low
17B:			
Napier	High	Low	Low
Kennebec, frequently flooded	High	Moderate	Low
Nodaway, frequently flooded	High	Moderate	Low
22D2:			
Dow, moderately eroded	High	Low	Low
22D3:			
Dow, severely eroded	High	Low	Low
22E3:			
Dow, severely eroded	High	Low	Low
26:			
Kennebec, occasionally flooded	High	Low	Moderate
35D2:			
Liston, moderately eroded	Moderate	High	Low
Burchard, moderately eroded	Moderate	Moderate	Low

Soil Features--Continued

Map symbol and soil name	Potential for frost action	Risk of corrosion	
		Uncoated steel	Concrete
35E2:			
Liston, moderately eroded	Moderate	High	Low
Burchard, moderately eroded	Moderate	Moderate	Low
35F2:			
Liston, moderately eroded	Moderate	High	Low
Burchard, moderately eroded	Moderate	Moderate	Low
35G:			
Liston	Moderate	High	Low
Burchard	Moderate	Moderate	Moderate
54:			
Zook, occasionally flooded	High	High	Moderate
54+:			
Zook, overwash, occasionally flooded	High	High	Moderate
59D2:			
Burchard, moderately eroded	Moderate	Moderate	Low
59E2:			
Burchard, moderately eroded	Moderate	Moderate	Low
99C2:			
Exira, moderately eroded	High	Moderate	Moderate
99D2:			
Exira, moderately eroded	High	Moderate	Moderate
99E2:			
Exira, moderately eroded	High	Moderate	Moderate
100B:			
Monona	High	Low	Low
100C2:			
Monona, moderately eroded	High	Low	Low
100D2:			
Monona, moderately eroded	High	Low	Low
100D3:			
Monona, severely eroded	High	Low	Low

Soil Features--Continued

Map symbol and soil name	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
100E2:			
Monona, moderately eroded	High	Low	Low
100E3:			
Monona, severely eroded	High	Low	Low
100F2:			
Monona, moderately eroded	High	Low	Low
100F3:			
Monona, severely eroded	High	Low	Low
111D3:			
Dow, severely eroded	High	Low	Low
Monona, severely eroded	High	Low	Low
111E3:			
Dow, severely eroded	High	Low	Low
Monona, severely eroded	High	Low	Low
125D3:			
Ida, severely eroded	High	Low	Low
Chute, severely eroded	Low	Low	Low
125E3:			
Ida, severely eroded	High	Low	Low
Chute, severely eroded	Low	Low	Low
133:			
Colo, occasionally flooded	High	High	Moderate
133+:			
Colo, overwash, occasionally flooded	High	High	Moderate
212:			
Kennebec, occasionally flooded	High	Moderate	Low
212+:			
Kennebec, overwash, occasionally flooded	High	Moderate	Low
220:			
Nodaway, occasionally flooded	High	Moderate	Low
266:			
Smithland, occasionally flooded	High	High	Moderate
266+:			
Smithland, overwash, occasionally flooded	High	High	Moderate

Soil Features--Continued

Map symbol and soil name	Potential for frost action	Risk of corrosion	
		Uncoated steel	Concrete
268D:			
Knox	High	Low	Low
268E:			
Knox	High	Low	Low
268F:			
Knox	High	Low	Low
430:			
Ackmore, occasionally flooded	High	High	Low
431B:			
Judson	High	Moderate	Low
Ackmore, frequently flooded	High	High	Low
Colo, overwash, frequently flooded	High	High	Moderate
509B:			
Marshall, terrace	High	Moderate	Moderate
509C:			
Marshall, terrace	High	Moderate	Moderate
509C2:			
Marshall, terrace, moderately eroded	High	Moderate	Moderate
509D2:			
Marshall, terrace, moderately eroded	High	Moderate	Moderate
509E2:			
Marshall, terrace, moderately eroded	High	Moderate	Moderate
510:			
Monona, terrace	High	Low	Low
510B:			
Monona, terrace	High	Low	Low
510C2:			
Monona, terrace, moderately eroded	High	Low	Low
510D2:			
Monona, terrace, moderately eroded	High	Low	Low
510E2:			
Monona, terrace, moderately eroded	High	Low	Low
630:			
Danbury, occasionally flooded	High	High	Low

Soil Features--Continued

Map symbol and soil name	Potential for frost action	Risk of corrosion	
		Uncoated steel	Concrete
670:			
Rawles, occasionally flooded	High	Moderate	Low
700:			
Monona, terrace	High	Low	Low
700B:			
Monona, terrace	High	Low	Low
700C2:			
Monona, terrace, moderately eroded	High	Low	Low
700D2:			
Monona, terrace, moderately eroded	High	Low	Low
717D:			
Napier	High	Low	Low
Gullied land, frequently flooded.			
740D:			
Hawick	Low	Low	Low
740E:			
Hawick	Low	Low	Low
740F:			
Hawick	Low	Low	Low
980C:			
Judson	High	Moderate	Low
Gullied land, frequently flooded.			
1220:			
Nodaway, channeled, frequently flooded	High	Moderate	Low
5010. Pits, sand and gravel			
5040. Udorthents			
5080. Udorthents			
AW. Animal waste lagoon			
SL. Sewage lagoon			
W. Water			

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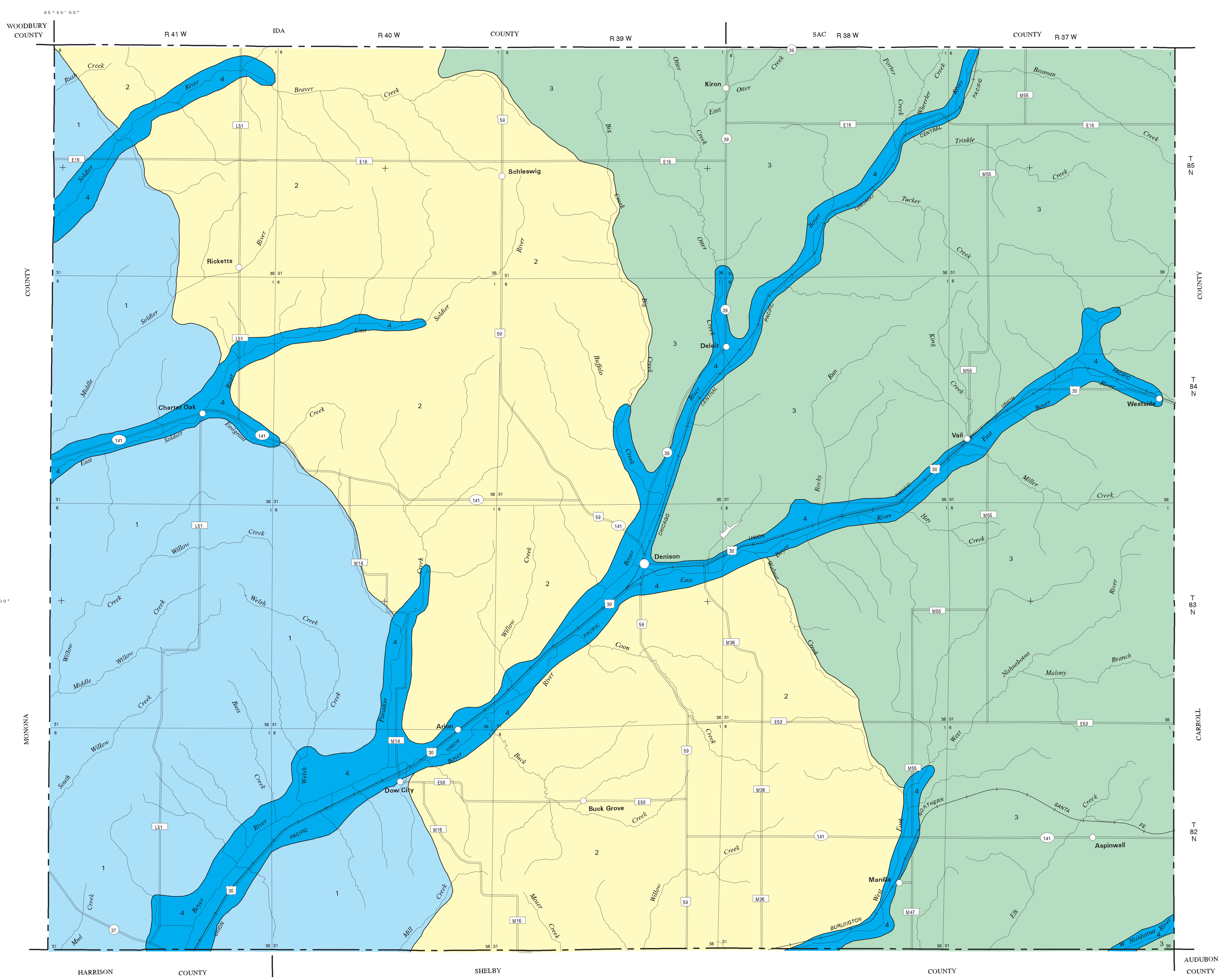


LEGEND

1	Monona-Napier-Ida association
2	Monona association
3	Marshall-Judson association
4	Nodaway association

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION
COOPERATIVE EXTENSION SERVICE,
IOWA STATE UNIVERSITY
DIVISION OF SOIL CONSERVATION,
IOWA DEPARTMENT OF AGRICULTURE
AND LAND STEWARDSHIP

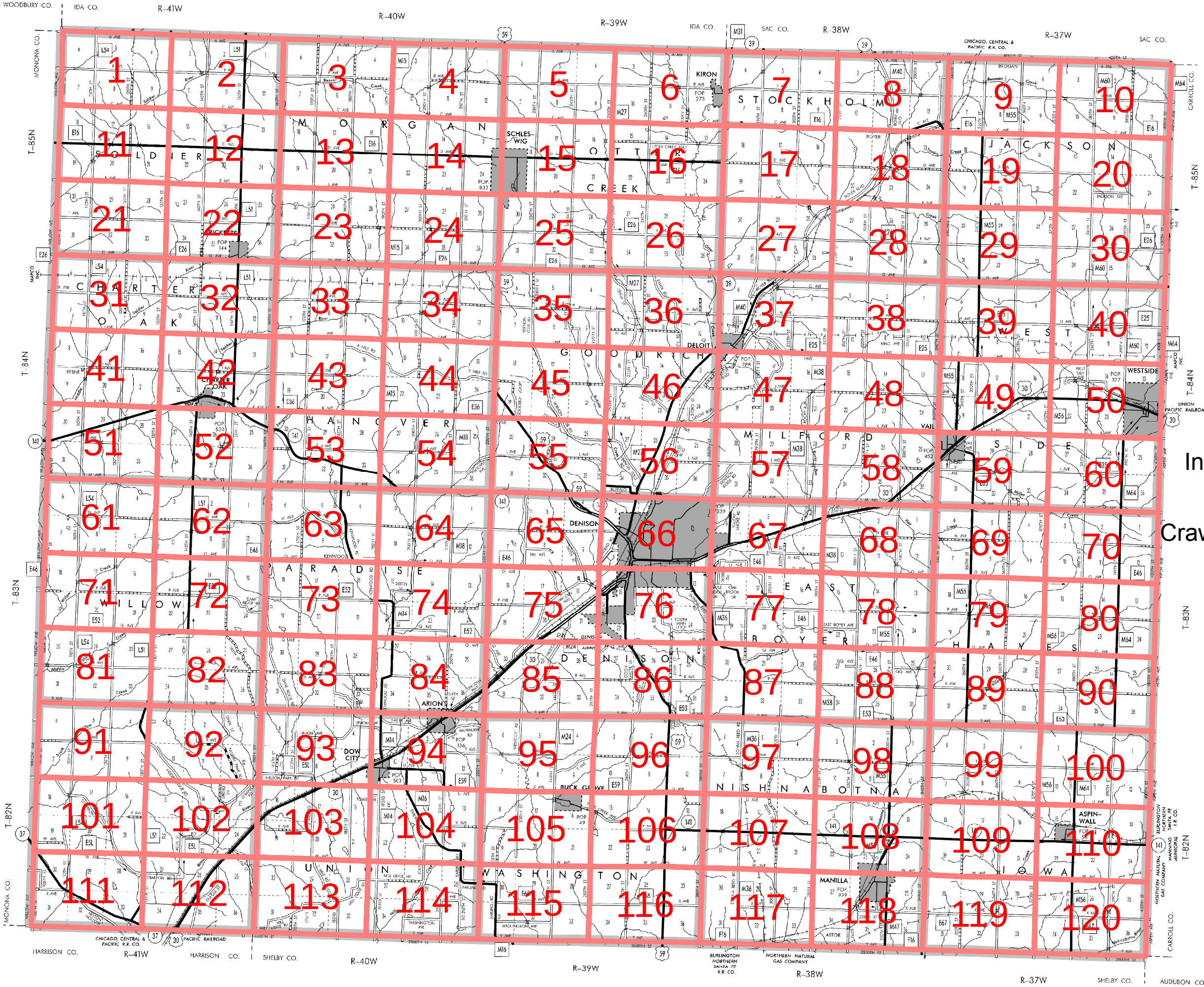
GENERAL SOIL MAP
CRAWFORD COUNTY, IOWA

MILES: 1 0 1 2 3

KILOMETERS: 1 0 1 2 3 4 5 6

SCALE = 1:105000

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



Index to Map Sheets

Crawford County

Iowa

CRAWFORD COUNTY, IOWA

SOIL LEGEND

Map unit symbols consist of a combination of numbers and letters. The initial numbers represent the kind of soil. A capital letter following those numbers indicates the class of slope. Map unit symbols that do not have a slope class letter are for nearly level soils or for miscellaneous areas. A final number of 2 following the slope class letter indicates that the map unit is predominantly moderately eroded. A final number of 3 indicates that the map unit is predominantly severely eroded. A plus sign (+) is used to designate an overwash phase.

1C	Ida silt loam, 5 to 9 percent slopes
1C3	Ida silt loam, 5 to 9 percent slopes, severely eroded
1D3	Ida silt loam, 9 to 14 percent slopes, severely eroded
1E3	Ida silt loam, 14 to 20 percent slopes, severely eroded
1F3	Ida silt loam, 20 to 30 percent slopes, severely eroded
8B	Judson silty clay loam, 2 to 5 percent slopes
8C	Judson silty clay loam, 5 to 9 percent slopes
9	Marshall silty clay loam, 0 to 2 percent slopes
9B	Marshall silty clay loam, 2 to 5 percent slopes
9B2	Marshall silty clay loam, 2 to 5 percent slopes, moderately eroded
9C	Marshall silty clay loam, 5 to 9 percent slopes
9C2	Marshall silty clay loam, 5 to 9 percent slopes, moderately eroded
9D	Marshall silty clay loam, 9 to 14 percent slopes
9D2	Marshall silty clay loam, 9 to 14 percent slopes, moderately eroded
9E2	Marshall silty clay loam, 14 to 18 percent slopes, moderately eroded
9E3	Marshall silty clay loam, 14 to 18 percent slopes, severely eroded
10B	Monona silt loam, 2 to 5 percent slopes
10B2	Monona silt loam, 2 to 5 percent slopes, moderately eroded
10C2	Monona silt loam, 5 to 9 percent slopes, moderately eroded
10D2	Monona silt loam, 9 to 14 percent slopes, moderately eroded
10D3	Monona silt loam, 9 to 14 percent slopes, severely eroded
10E2	Monona silt loam, 14 to 20 percent slopes, moderately eroded
10E3	Monona silt loam, 14 to 20 percent slopes, severely eroded
10F2	Monona silt loam, 20 to 30 percent slopes, moderately eroded
10F3	Monona silt loam, 20 to 30 percent slopes, severely eroded
12B	Napier silt loam, 2 to 5 percent slopes
12C	Napier silt loam, 5 to 9 percent slopes
17B	Napier-Kennebec-Nodaway complex, 2 to 5 percent slopes
22D2	Dow silt loam, 9 to 14 percent slopes, moderately eroded
22D3	Dow silt loam, 9 to 14 percent slopes, severely eroded
22E3	Dow silt loam, 14 to 20 percent slopes, severely eroded
26	Kennebec silty clay loam, 0 to 2 percent slopes, occasionally flooded
35D2	Liston-Burchard complex, 9 to 14 percent slopes, moderately eroded
35E2	Liston-Burchard complex, 14 to 18 percent slopes, moderately eroded
35F2	Liston-Burchard complex, 18 to 25 percent slopes, moderately eroded
35G	Liston-Burchard complex, 25 to 40 percent slopes
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded
54+	Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash
59D2	Burchard clay loam, 9 to 14 percent slopes, moderately eroded
59E2	Burchard clay loam, 14 to 18 percent slopes, moderately eroded
99C2	Exira silty clay loam, 5 to 9 percent slopes, moderately eroded
99D2	Exira silty clay loam, 9 to 14 percent slopes, moderately eroded
99E2	Exira silty clay loam, 14 to 18 percent slopes, moderately eroded
100B	Monona silty clay loam, 2 to 5 percent slopes
100C2	Monona silty clay loam, 5 to 9 percent slopes, moderately eroded
100D2	Monona silty clay loam, 9 to 14 percent slopes, moderately eroded
100D3	Monona silty clay loam, 9 to 14 percent slopes, severely eroded
100E2	Monona silty clay loam, 14 to 20 percent slopes, moderately eroded
100E3	Monona silty clay loam, 14 to 20 percent slopes, severely eroded
100F2	Monona silty clay loam, 20 to 30 percent slopes, moderately eroded
100F3	Monona silty clay loam, 20 to 30 percent slopes, severely eroded
111D3	Dow-Monona complex, 9 to 14 percent slopes, severely eroded
111E3	Dow-Monona complex, 14 to 20 percent slopes, severely eroded
125D3	Ida-Chute complex, 9 to 14 percent slopes, severely eroded
125E3	Ida-Chute complex, 14 to 20 percent slopes, severely eroded
133	Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded
133+	Colo silt loam, 0 to 2 percent slopes, occasionally flooded, overwash
212	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded
212+	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded, overwash
220	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded
266	Smithland silty clay loam, 0 to 2 percent slopes, occasionally flooded
266+	Smithland silt loam, 0 to 2 percent slopes, occasionally flooded, overwash
268D	Knox silt loam, 9 to 14 percent slopes
268E	Knox silt loam, 14 to 20 percent slopes
268F	Knox silt loam, 20 to 30 percent slopes
430	Ackmore silt loam, 0 to 2 percent slopes, occasionally flooded
431B	Judson-Ackmore-Colo, overwash, complex, 2 to 5 percent slopes
509B	Marshall silty clay loam, terrace, 2 to 5 percent slopes
509C	Marshall silty clay loam, terrace, 5 to 9 percent slopes
509C2	Marshall silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded
509D2	Marshall silty clay loam, terrace, 9 to 14 percent slopes, moderately eroded
509E2	Marshall silty clay loam, terrace, 14 to 20 percent slopes, moderately eroded
510	Monona silt loam, terrace, 0 to 2 percent slopes
510B	Monona silt loam, terrace, 2 to 5 percent slopes
510C2	Monona silt loam, terrace, 5 to 9 percent slopes, moderately eroded
510D2	Monona silt loam, terrace, 9 to 14 percent slopes, moderately eroded
510E2	Monona silt loam, terrace, 14 to 20 percent slopes, moderately eroded
630	Danbury silt loam, 0 to 2 percent slopes, occasionally flooded
670	Rawles silt loam, 0 to 2 percent slopes, occasionally flooded
700	Monona silty clay loam, terrace, 0 to 2 percent slopes
700B	Monona silty clay loam, terrace, 2 to 5 percent slopes
700C2	Monona silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded
700D2	Monona silty clay loam, terrace, 9 to 14 percent slopes, moderately eroded
717D	Napier-Gullied land complex, 5 to 14 percent slopes
740D	Hawick gravelly sandy loam, 9 to 14 percent slopes
740E	Hawick gravelly sandy loam, 14 to 18 percent slopes
740F	Hawick gravelly sandy loam, 18 to 25 percent slopes
980C	Judson-Gullied land complex, 5 to 9 percent slopes
1220	Nodaway silt loam, channeled, 0 to 2 percent slopes, frequently flooded
5010	Pits, sand and gravel
5040	Udorthents, loamy
5080	Udorthents, sanitary landfill
AW	Animal waste lagoon
SL	Sewage lagoon
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

SOIL SURVEY FEATURES

SOIL DELINEATIONS AND LABELS

STANDARD LANDFORM AND MISCELLANEOUS SURFACE FEATURES

- Non-bedrock escarpment
- Gully
- Short steep slope
- Gravel pit
- Gravelly spot
- Sandy spot
- Severely eroded spot
- Wet spot

AD HOC FEATURES

- Borrow area
- Clay spot, red
- Calcareous spot
- Clay spot, gray
- Glacial till spot

BOUNDARIES

- County or parish
- Public Land Survey System Section Boundary (14)
- Airport, airfield
- Cemetery
- County/State park

LOCATED OBJECTS

- Small cemetery
- Church
- School

DAMS

- Medium or Small

HYDROGRAPHIC FEATURES

DRAINAGE

- Perennial stream

INTERMITTENT

- Crossable with usual farm equipment
- Not crossable with usual farm equipment
- Drainage end (indicates direction of flow)

Township 85N Range 41W

Soil Survey of Crawford County, Iowa

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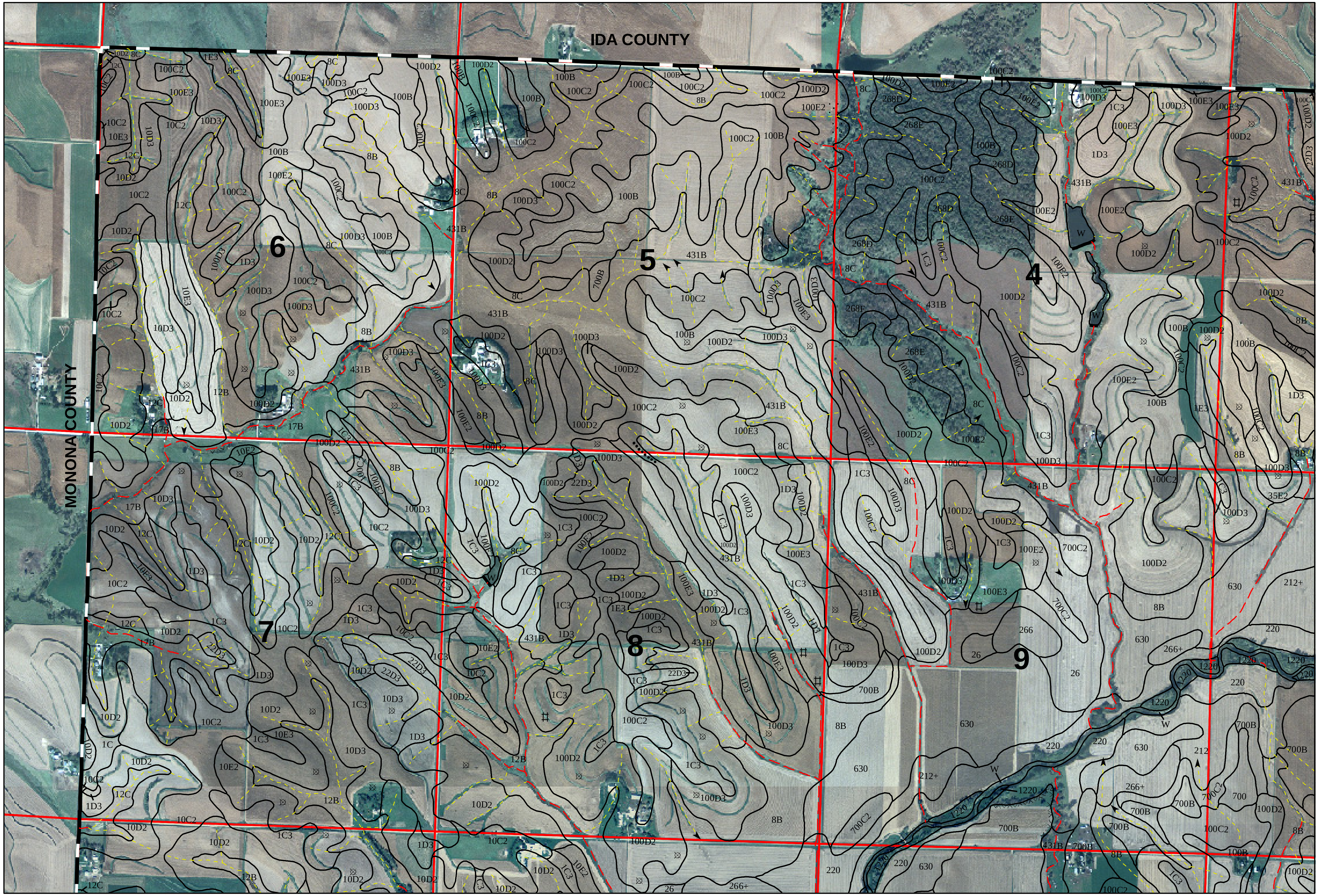

joins sheet 2

joins sheet 11

12

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 85N Range 41W

2

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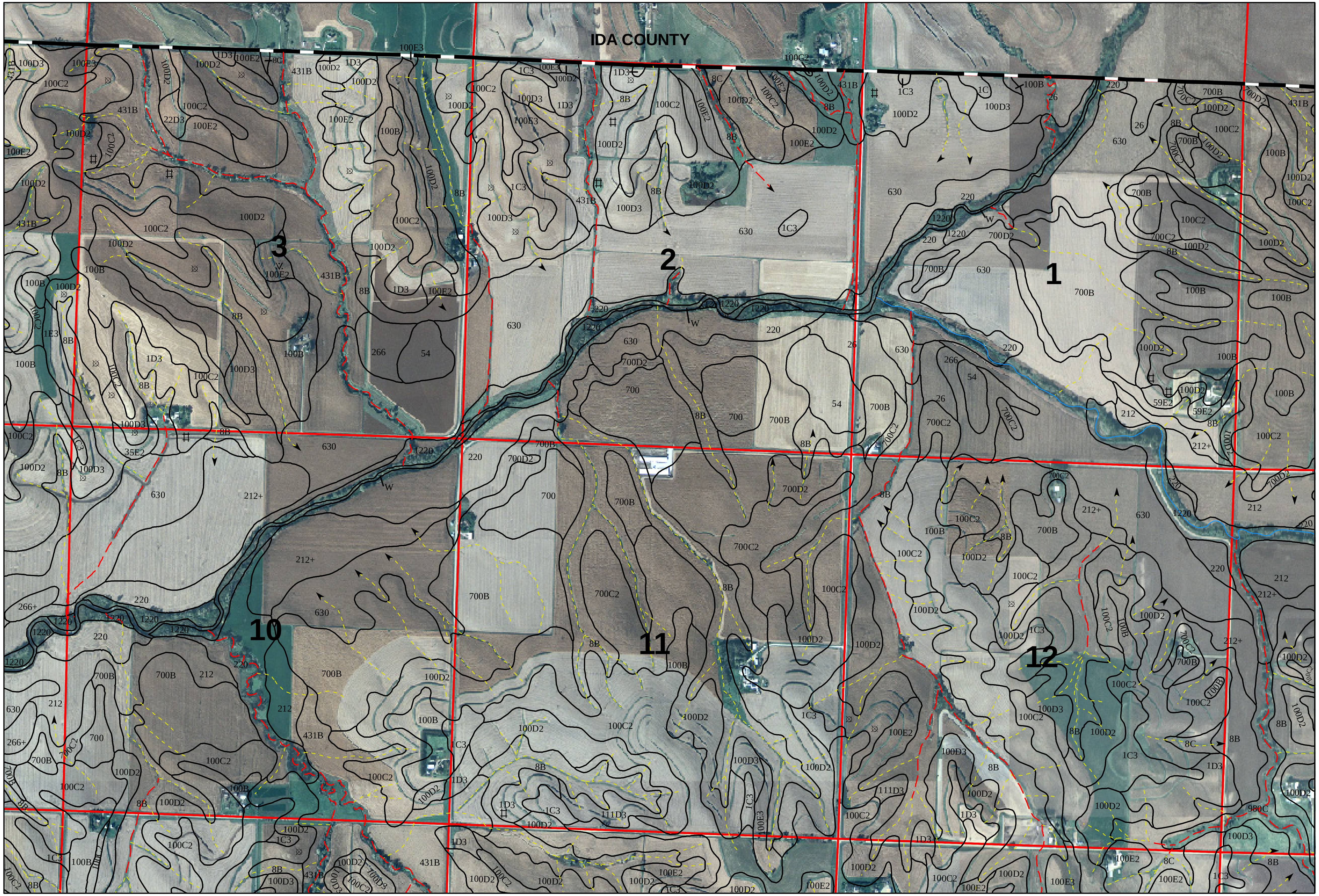

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 85N Range 40W

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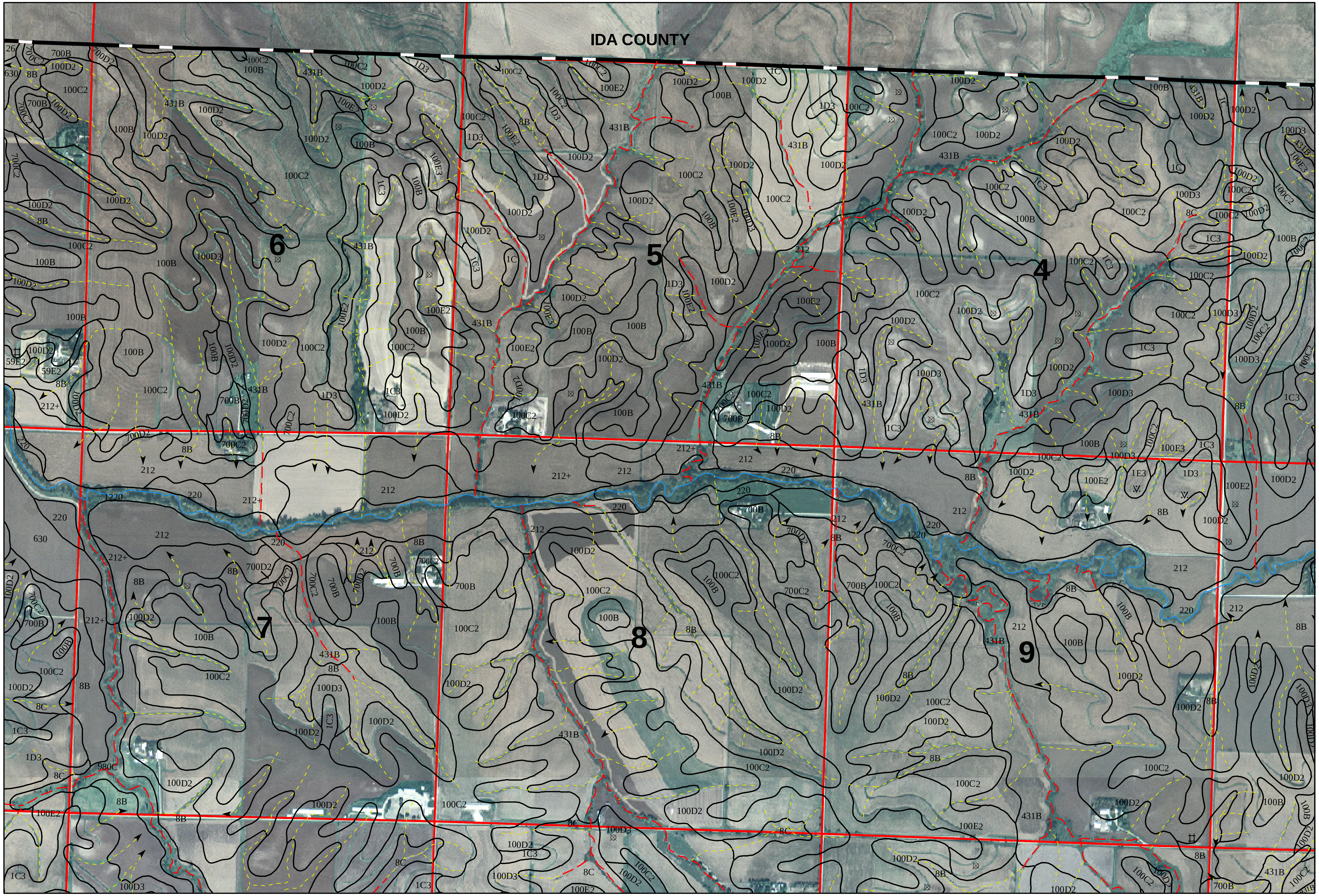

0 1/4 1/2 3/4 1 Miles

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Township 85N Range 40W

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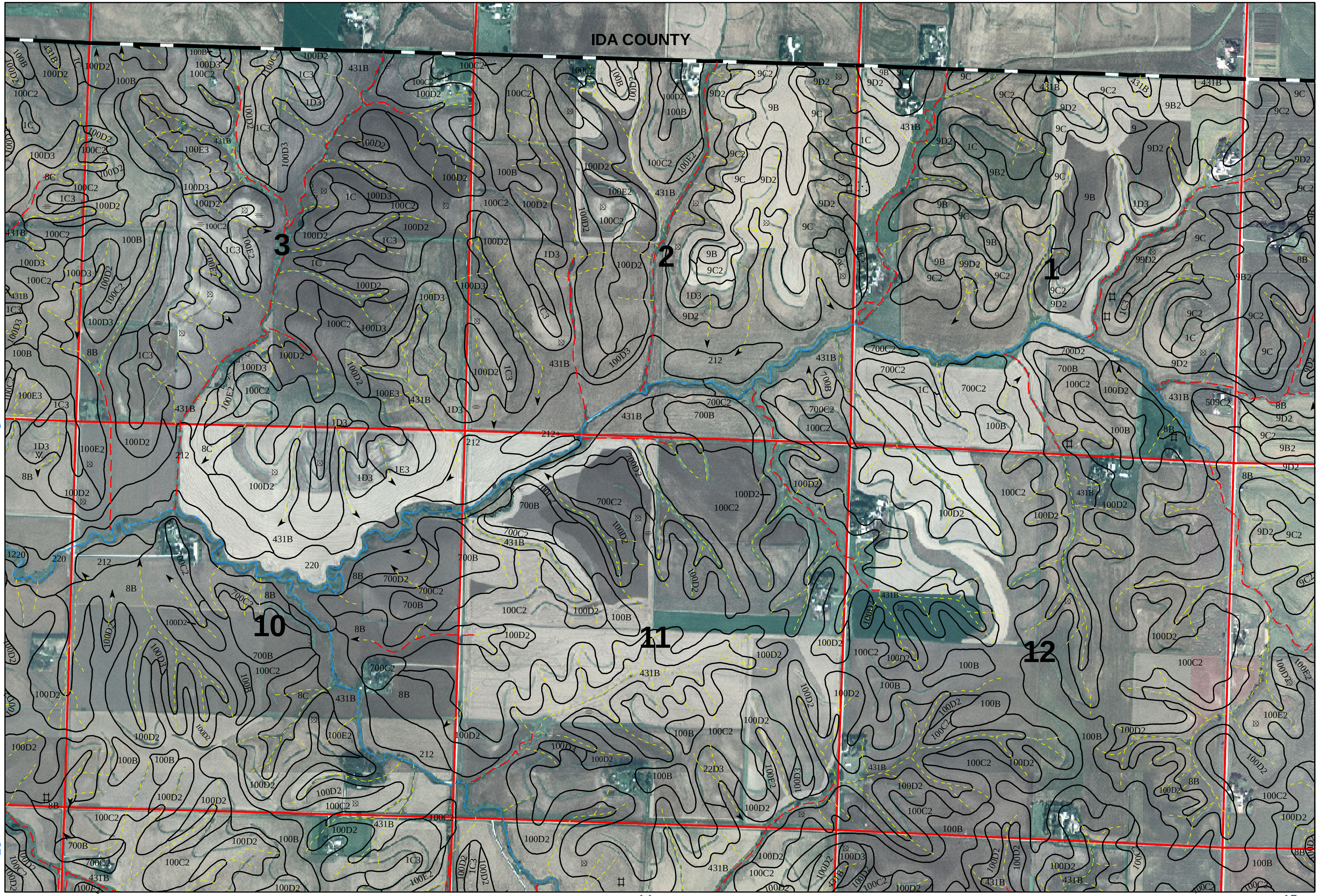

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13

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15

N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 85N Range 39W

5

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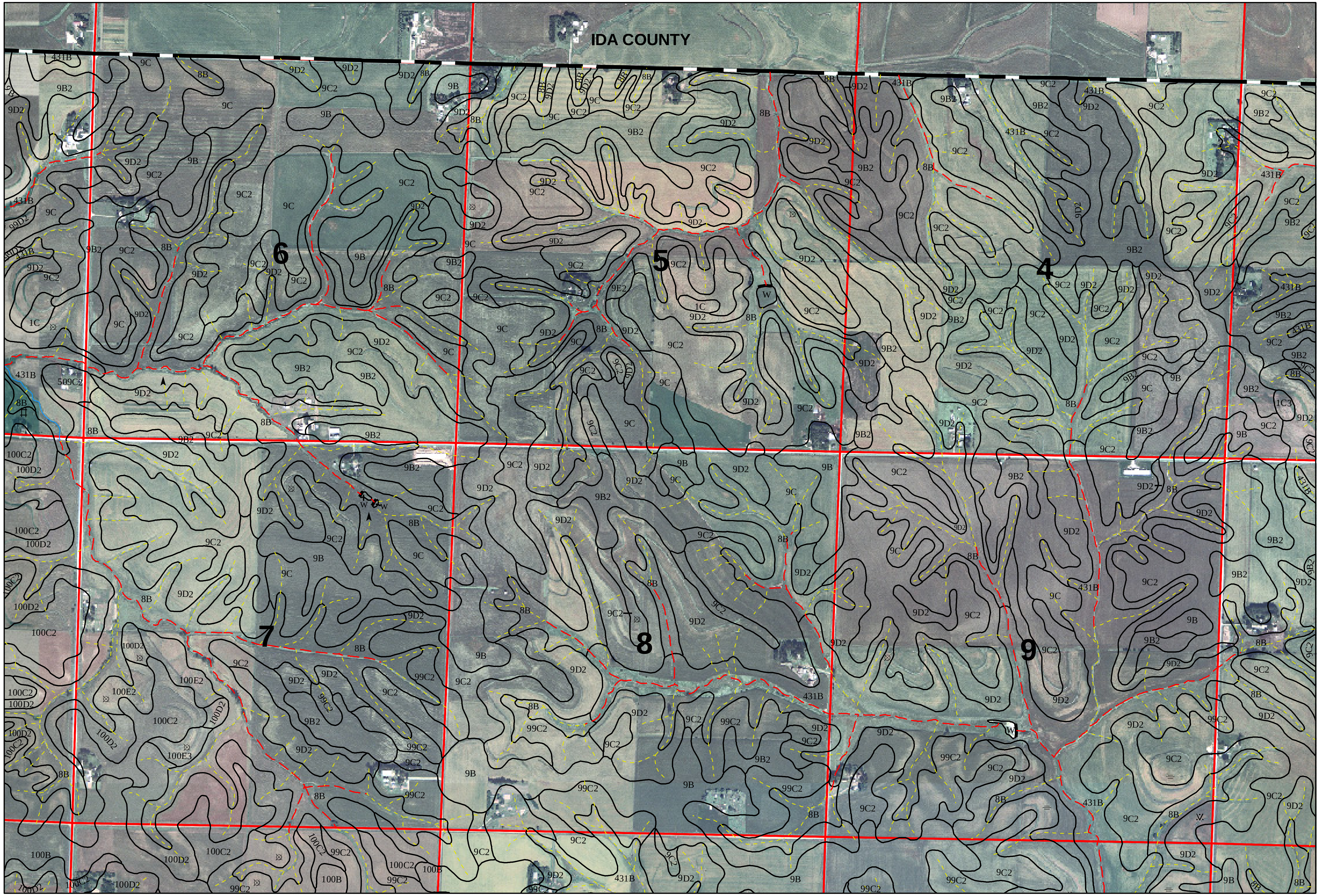

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 85N Range 39W

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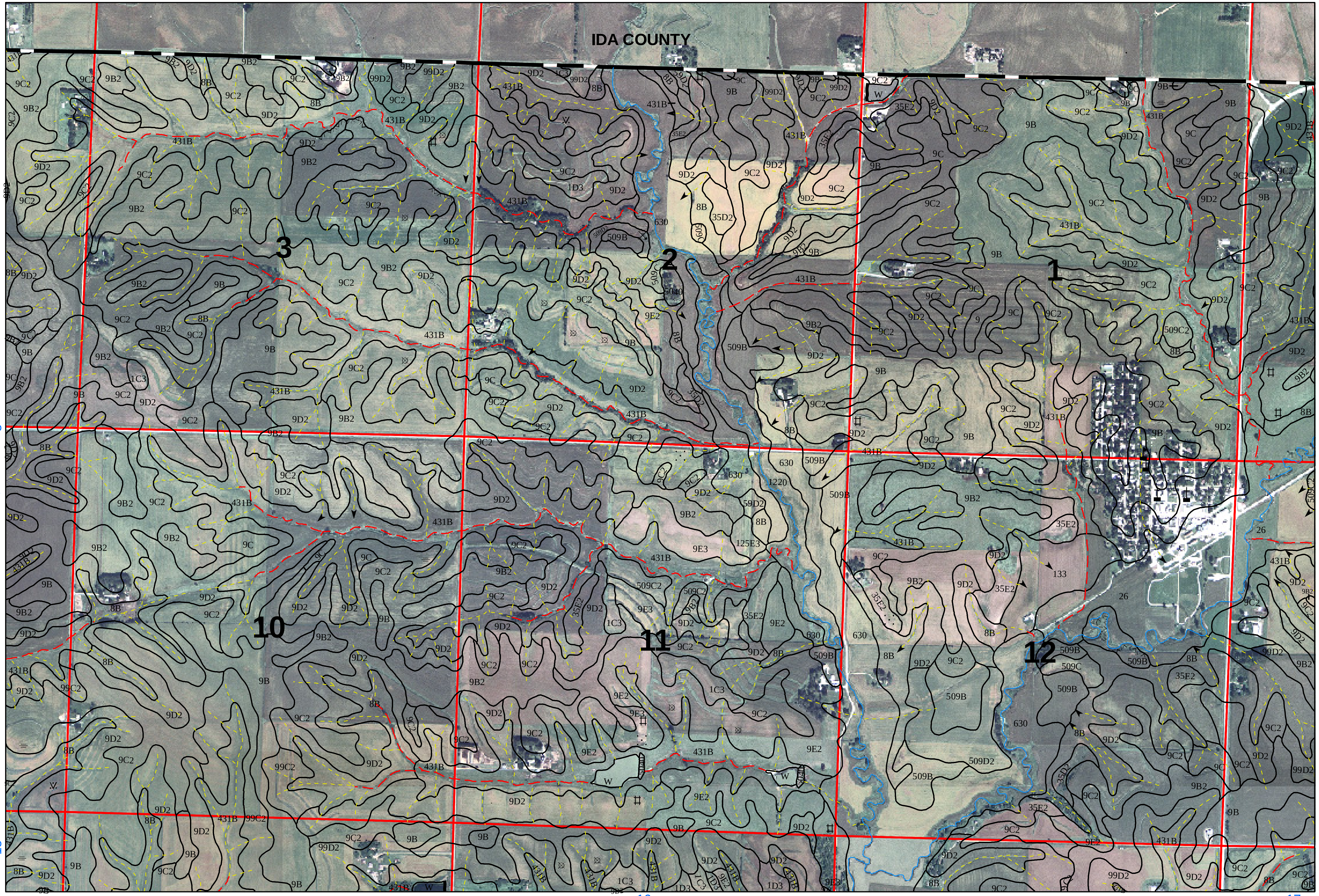

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 85N Range 38W

7

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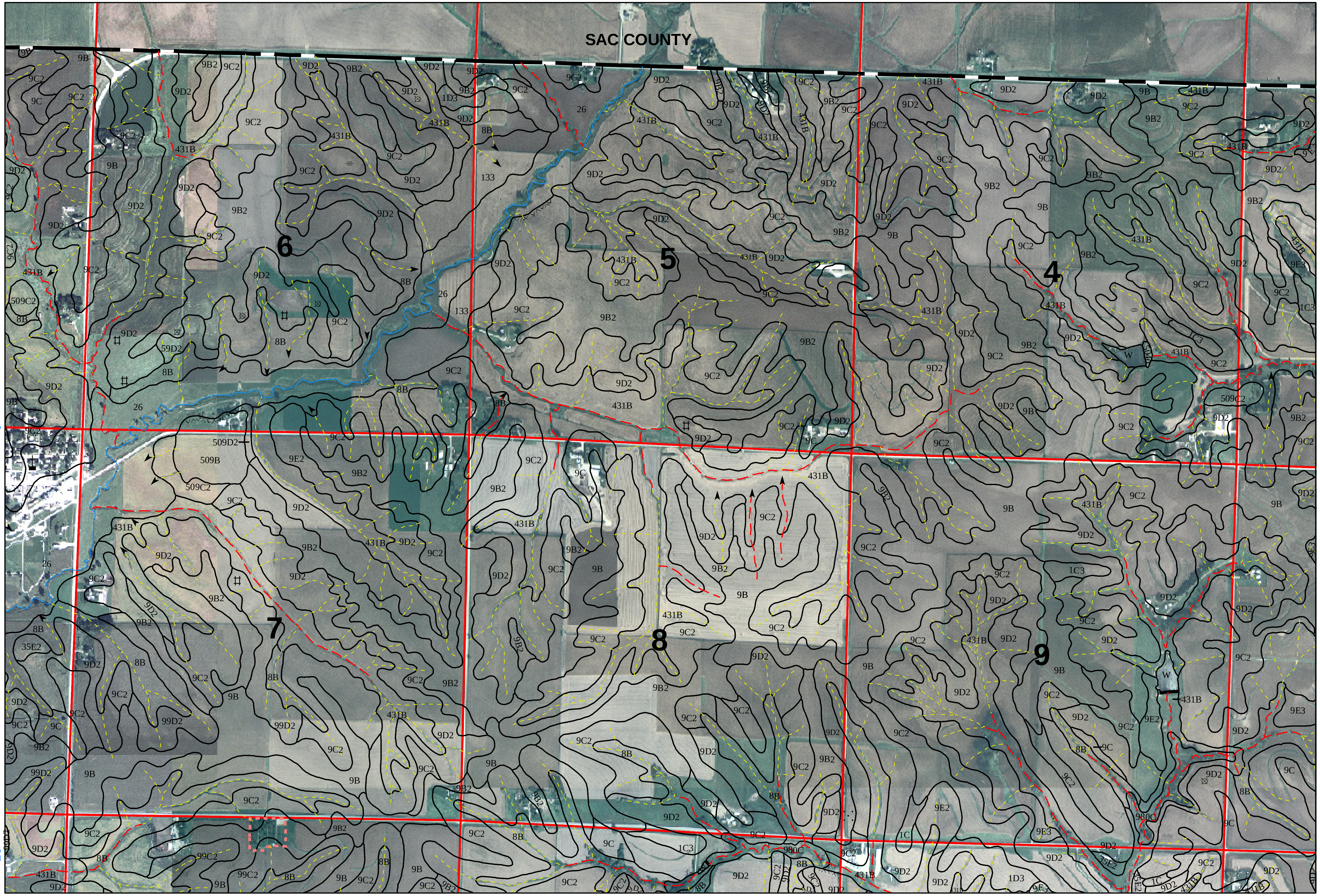

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 85N Range 38W

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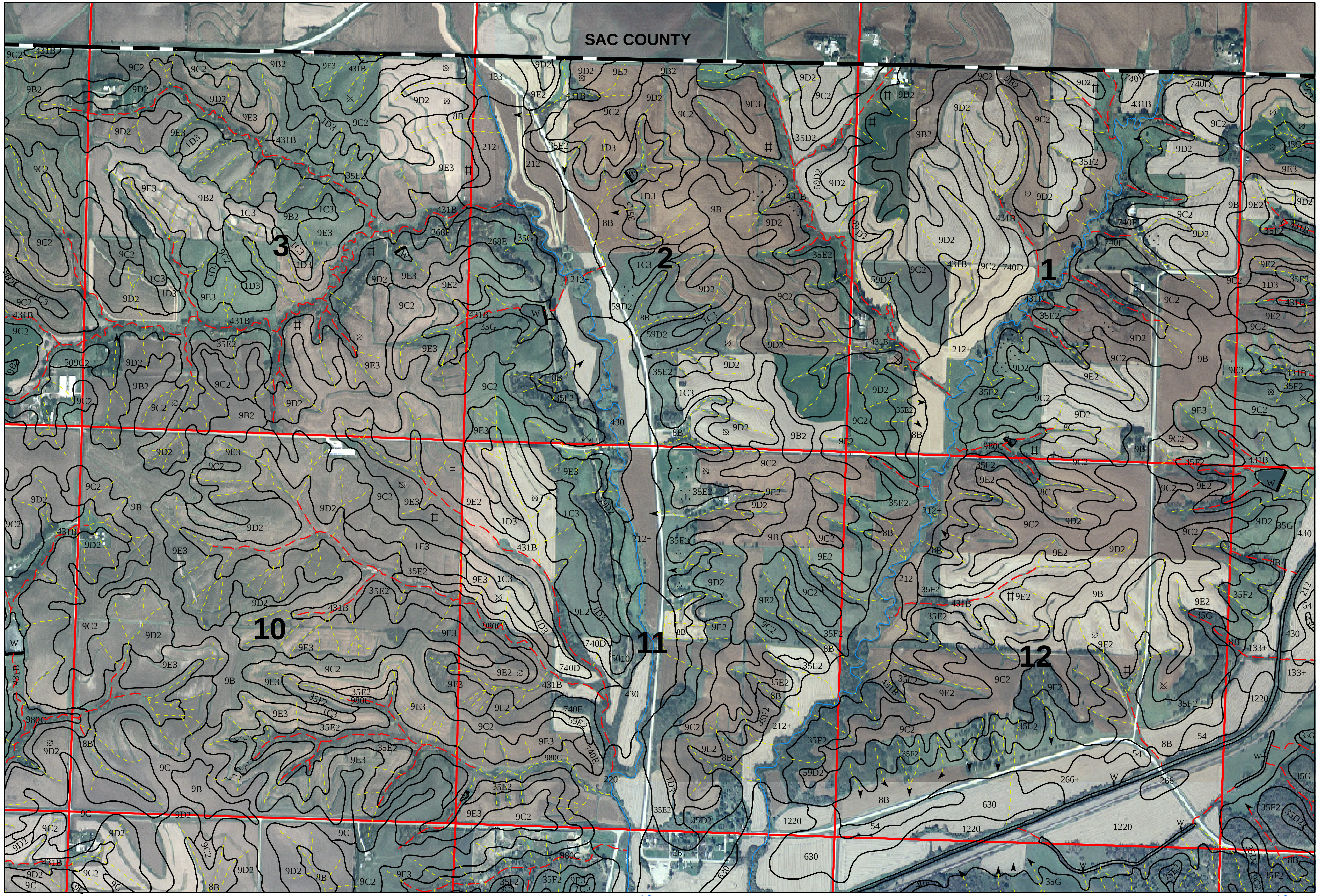

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17

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19

N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 85N Range 37W

9

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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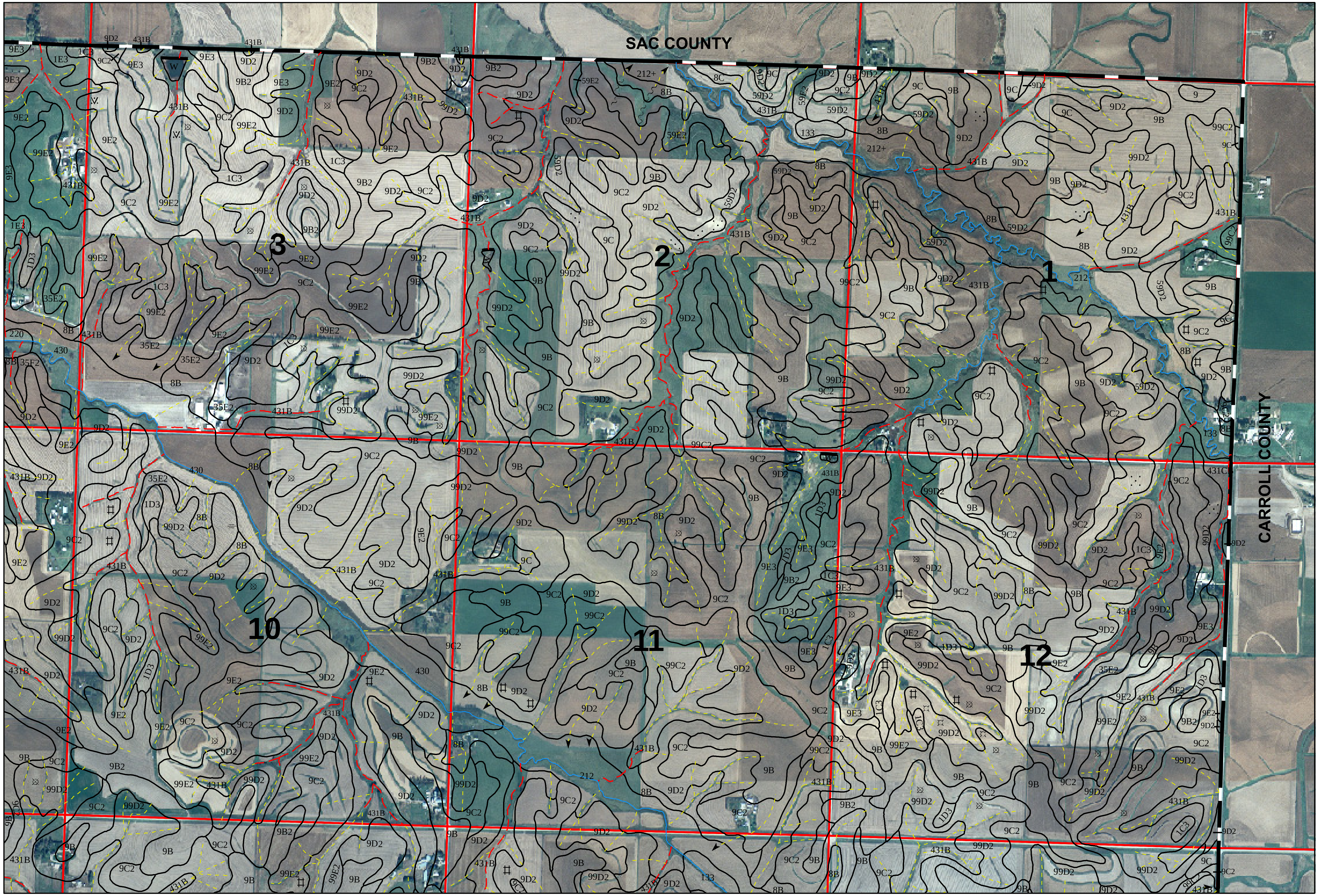
10

Township 85N Range 37W

10



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19

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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11

Township 85N Range 41W

11

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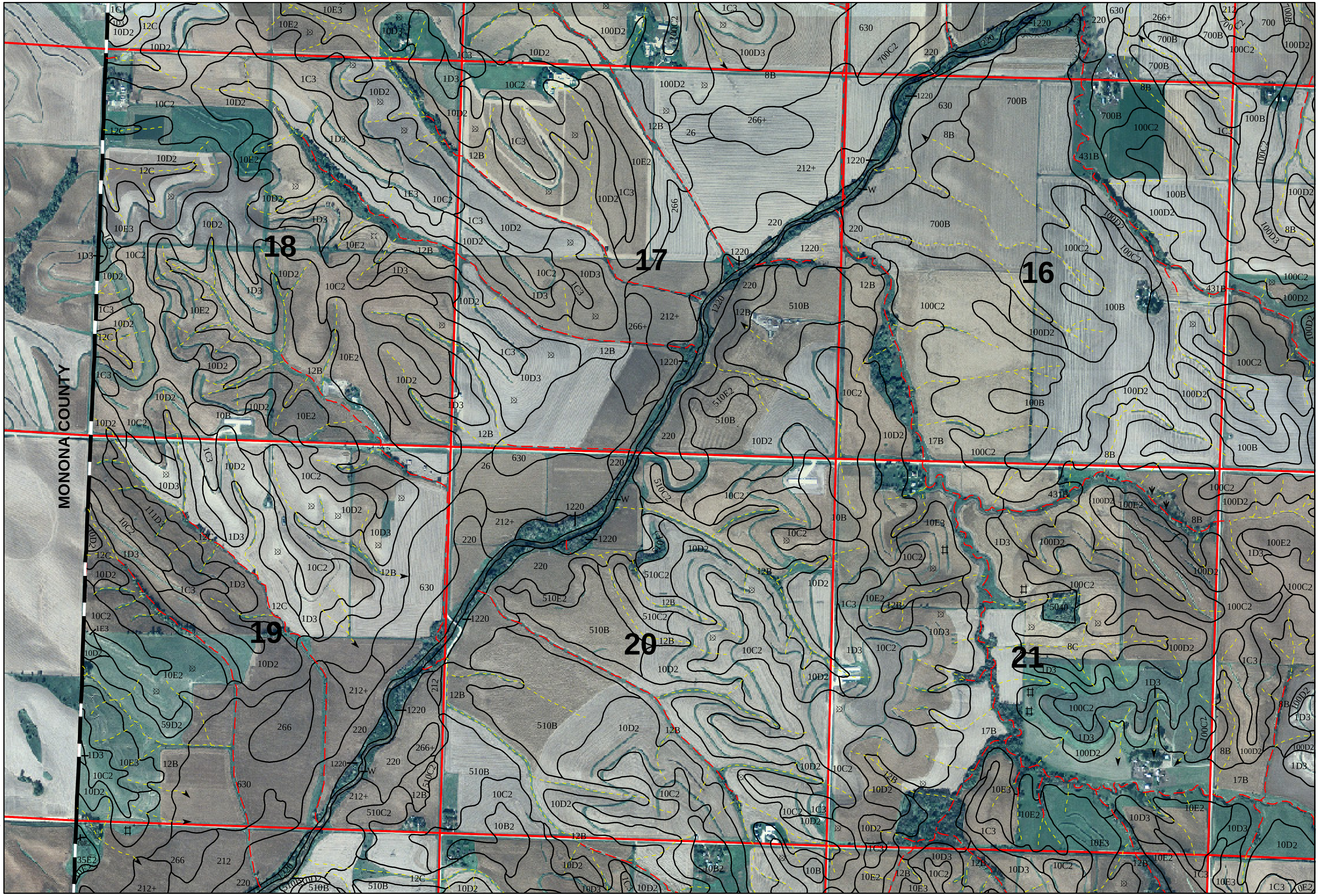

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0 1/4 1/2 3/4 1 Miles

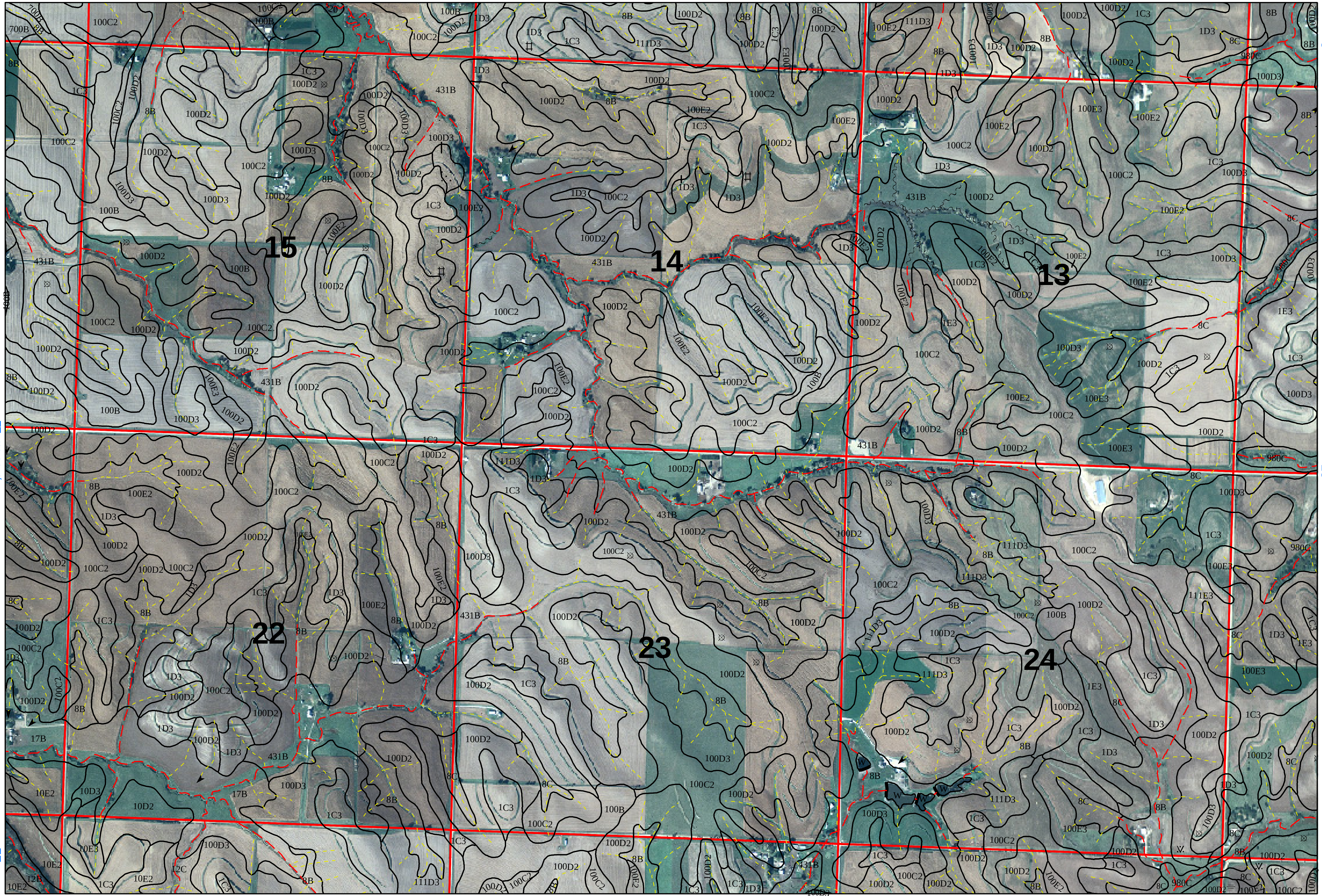
0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

12

Township 85N Range 41W

12



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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13

Township 85N Range 40W

13

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4

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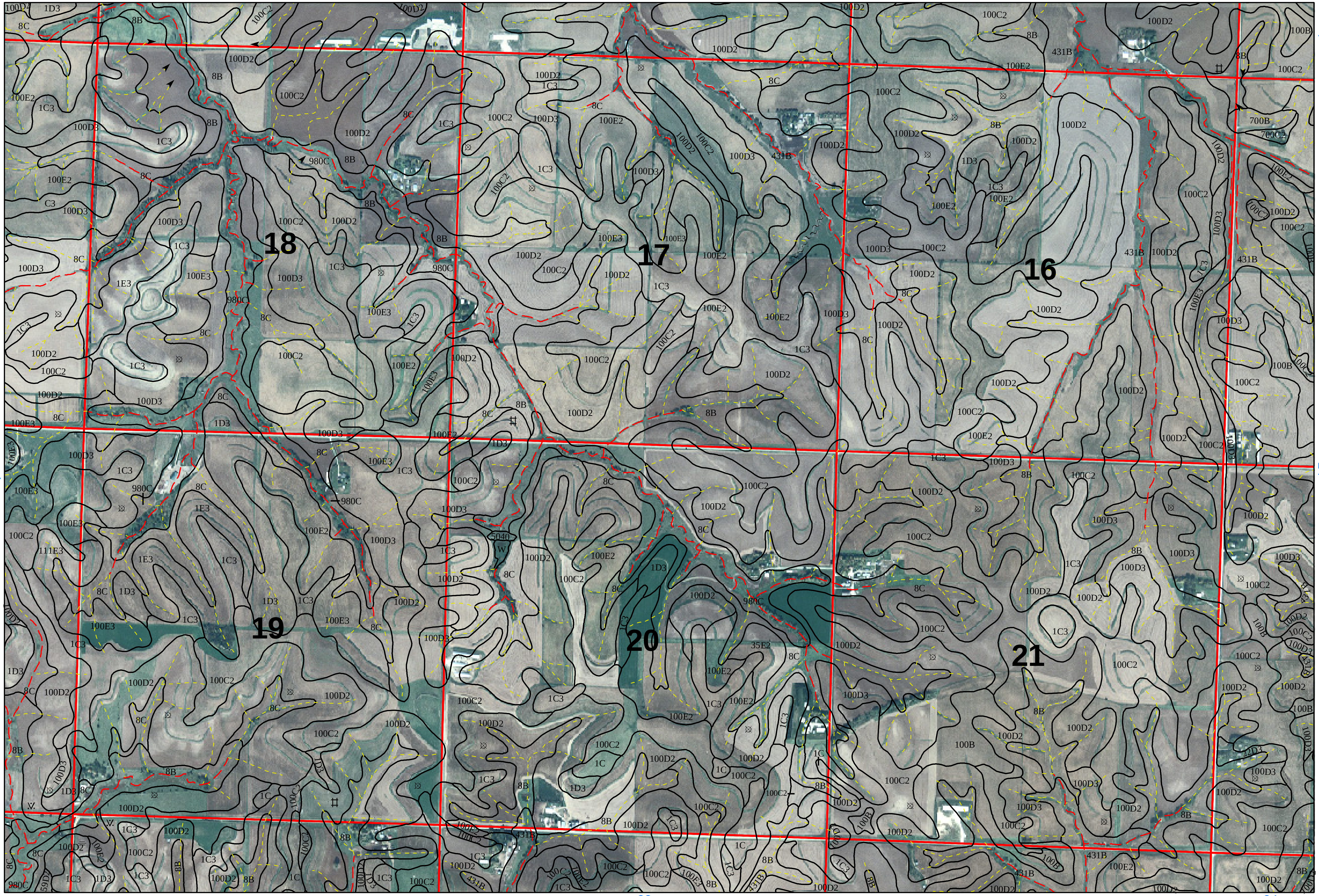
joins sheet 14

22



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24

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

Feet 0 1,000 2,000 3,000 4,000 5,000

N

United States Department of Agriculture
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14

Township 85N Range 40W

14

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3 joins sheet 4 5

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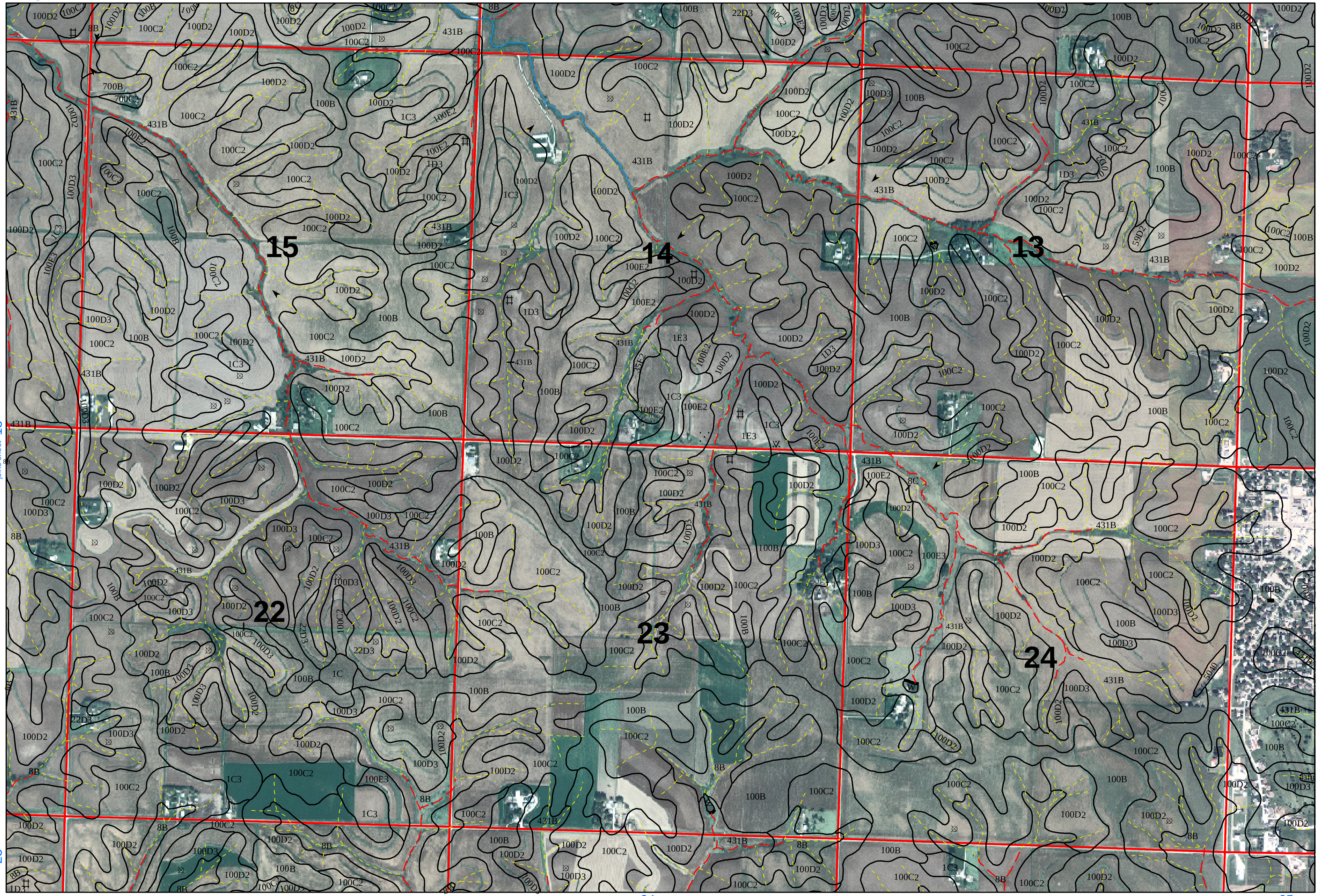

23 joins sheet 24 25

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 85N Range 39W

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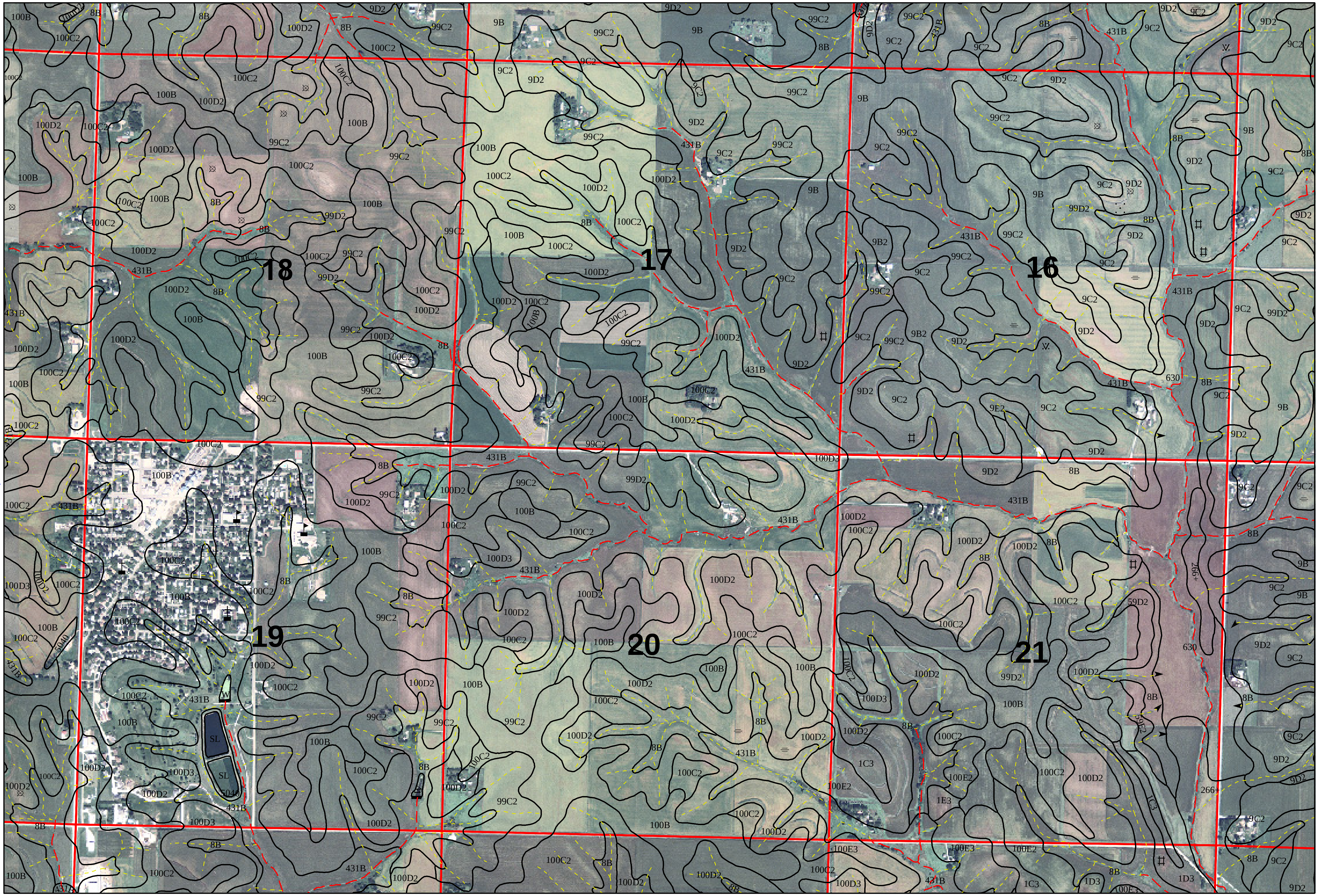

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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16

Township 85N Range 39W

16

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7

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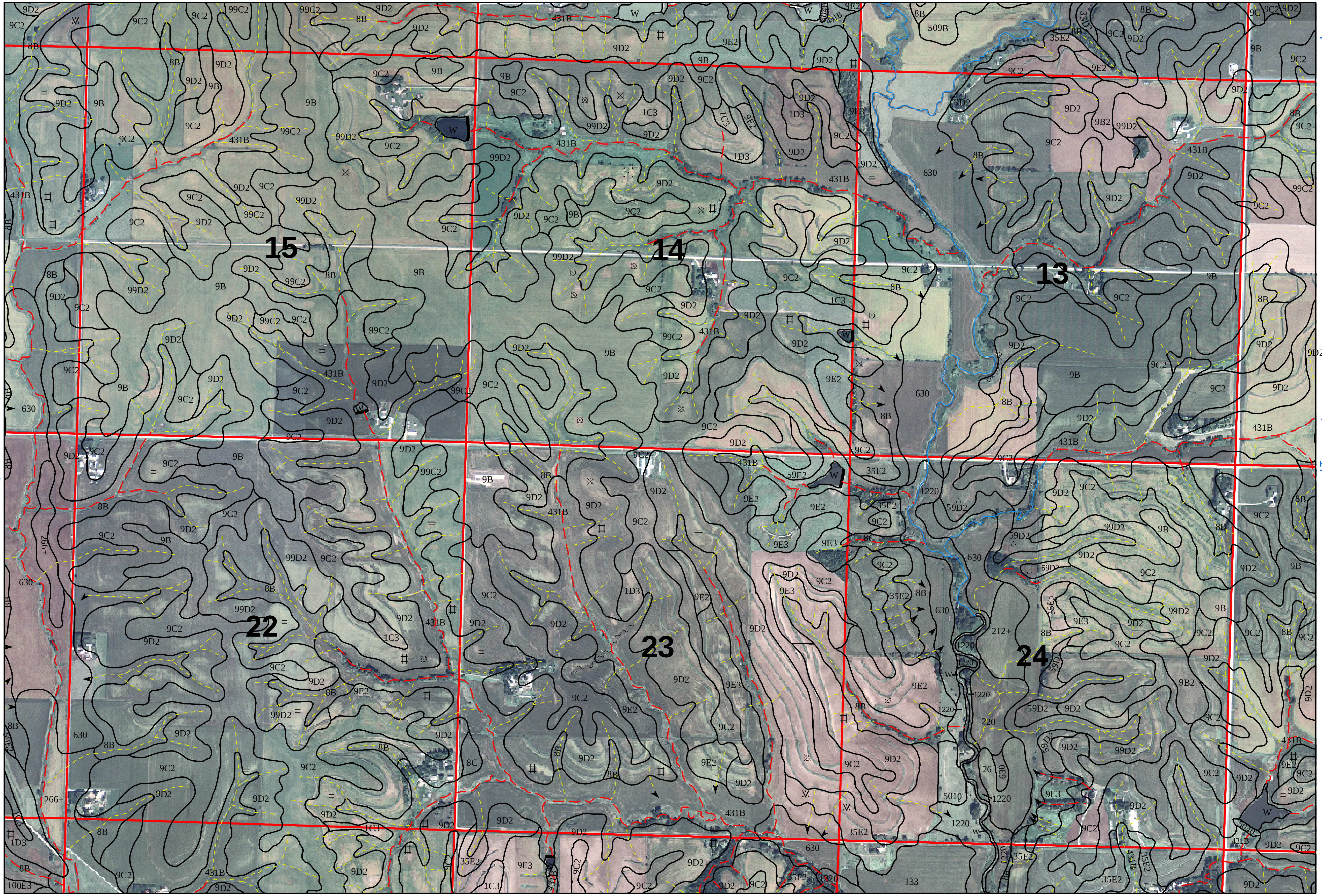

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27

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

17

Township 85N Range 38W

17

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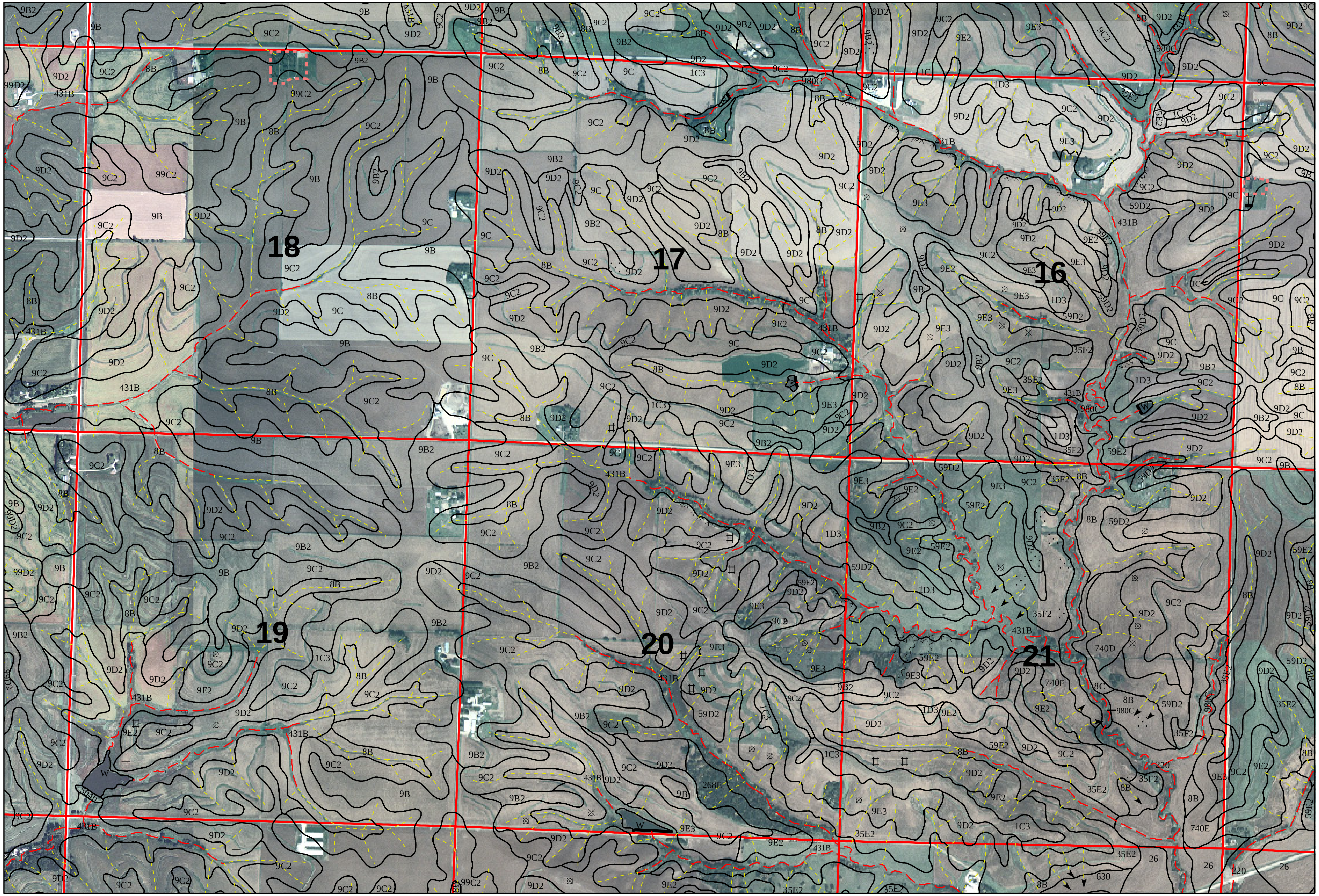
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



0 | 1/4 | 1/2 | 3/4 | 1 Miles

0 | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 Feet

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18

Township 85N Range 38W

18

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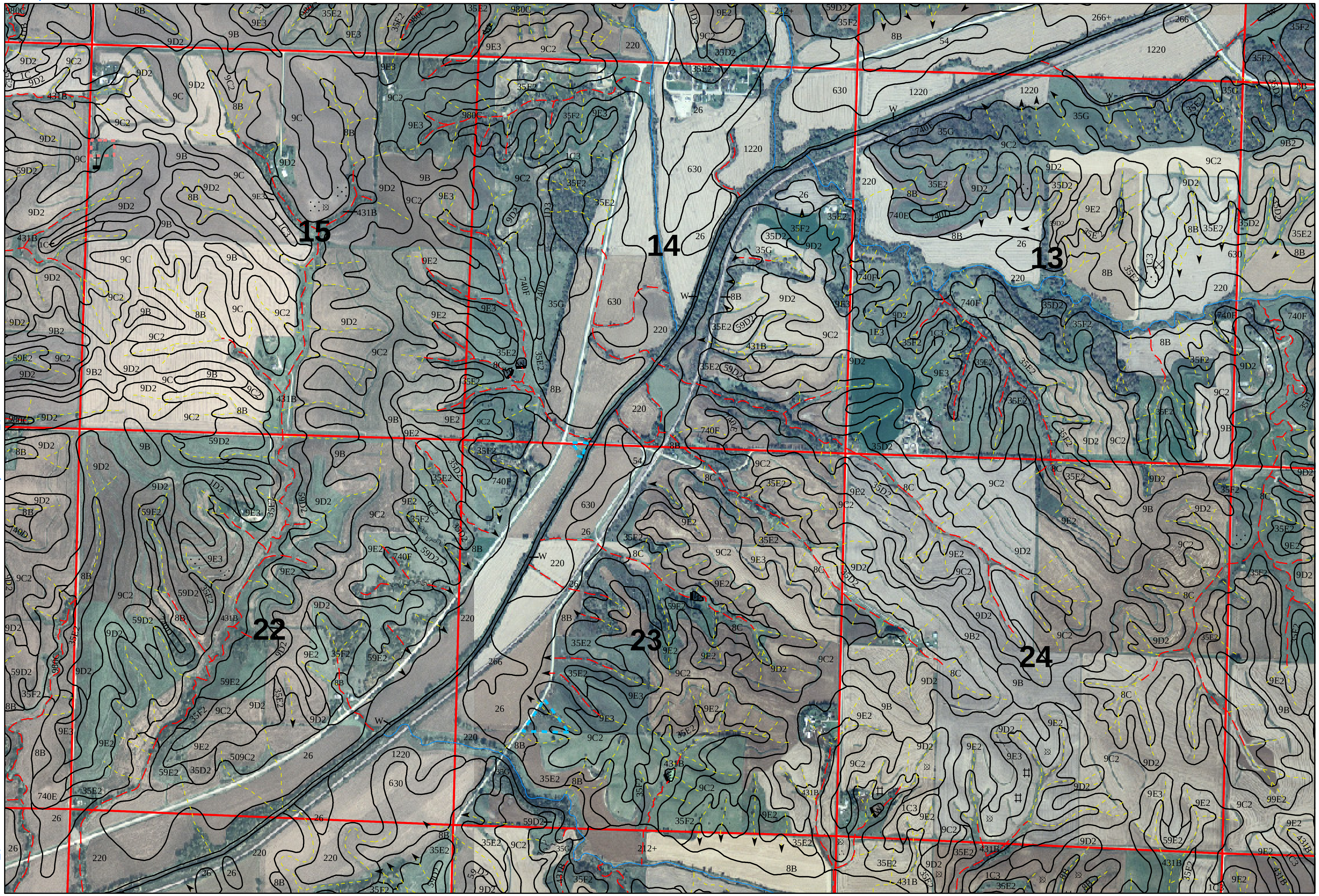

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9

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27

joins sheet 28

29

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

19 19

Township 85N Range 37W

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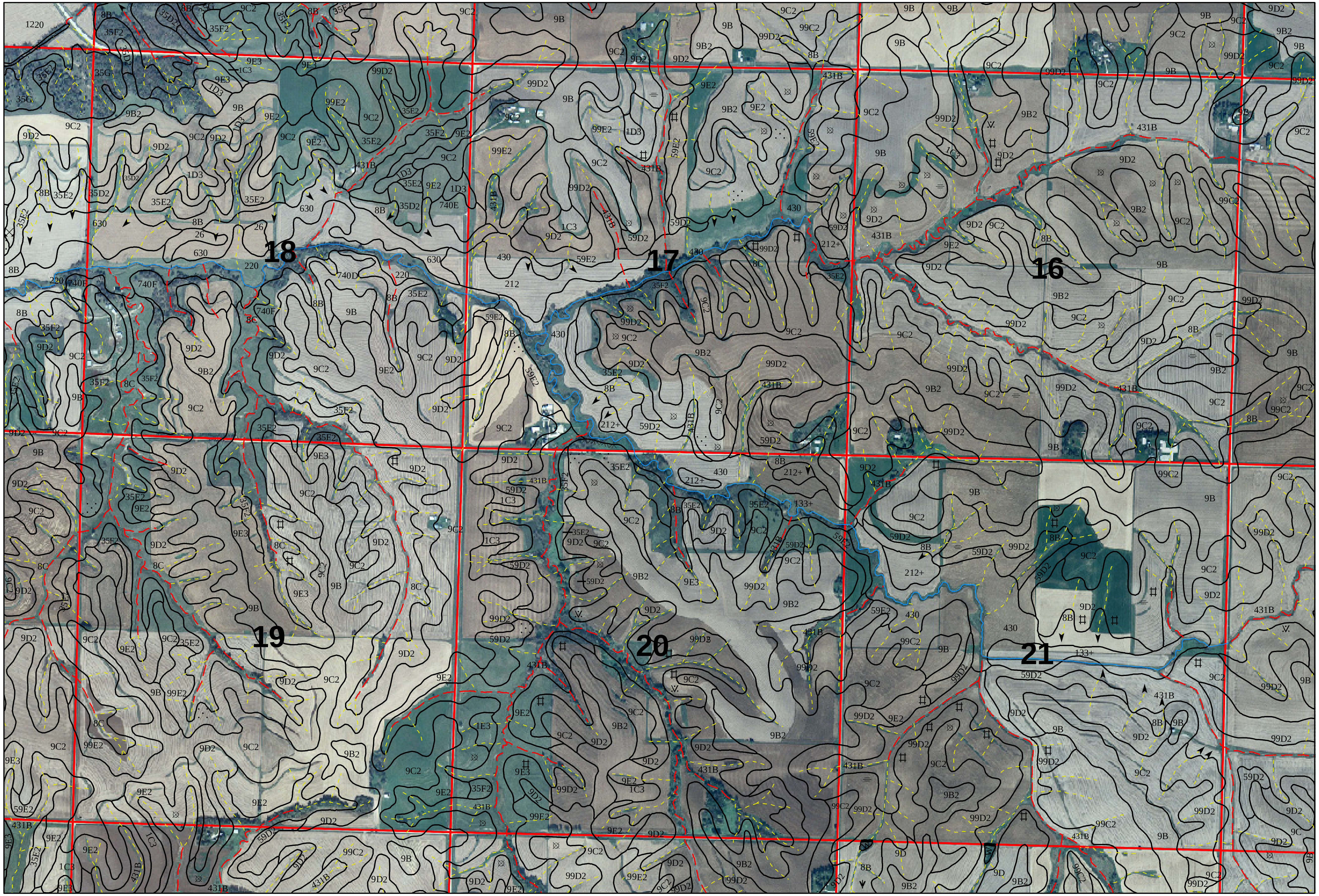
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

8 joins sheet 9 10

18 joins sheet



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28 joins sheet 29 30

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 85N Range 37W

Soil Survey of Crawford County, Iowa

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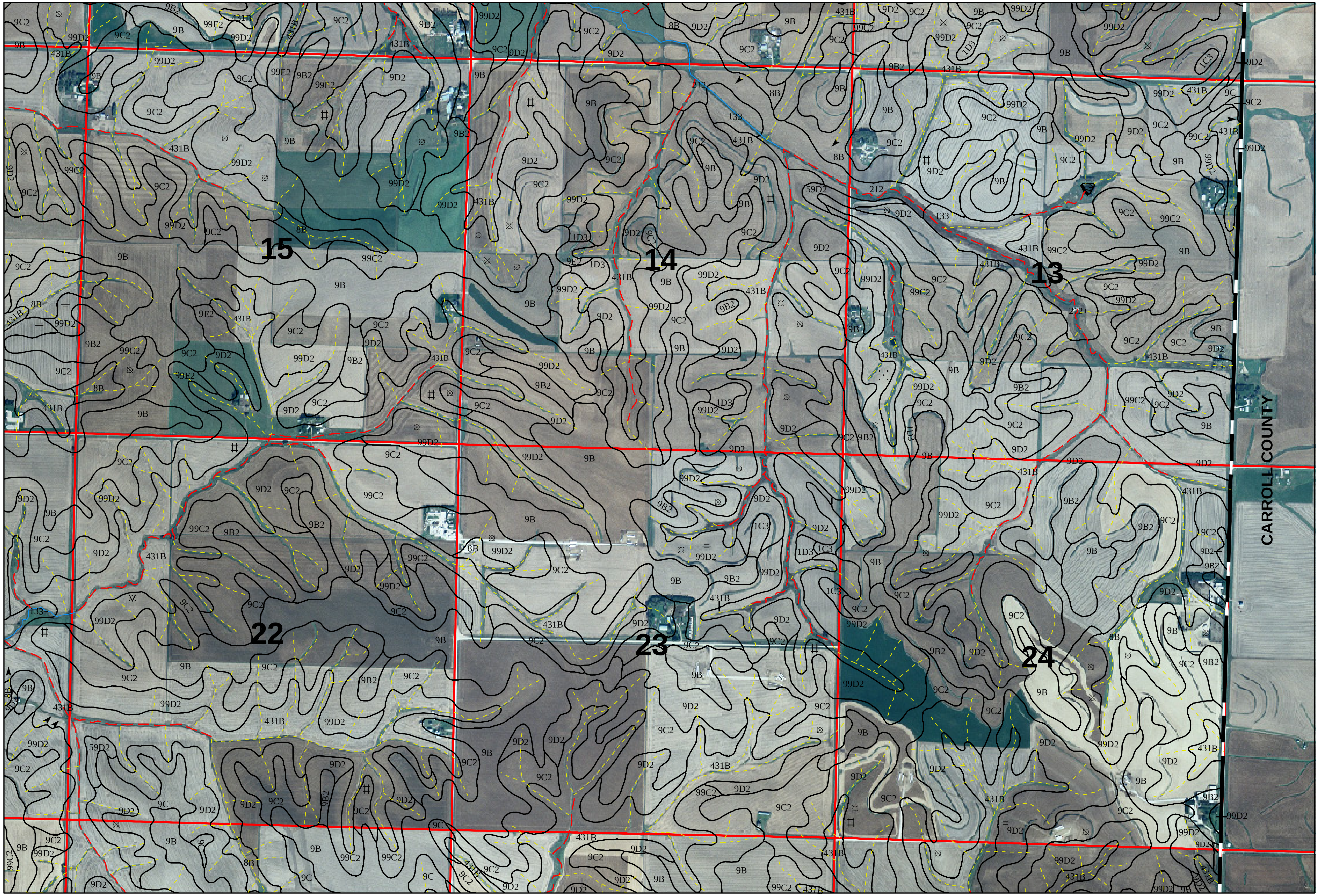
9
joins sheet 10
joins sheet 19
29
joins sheet 30



0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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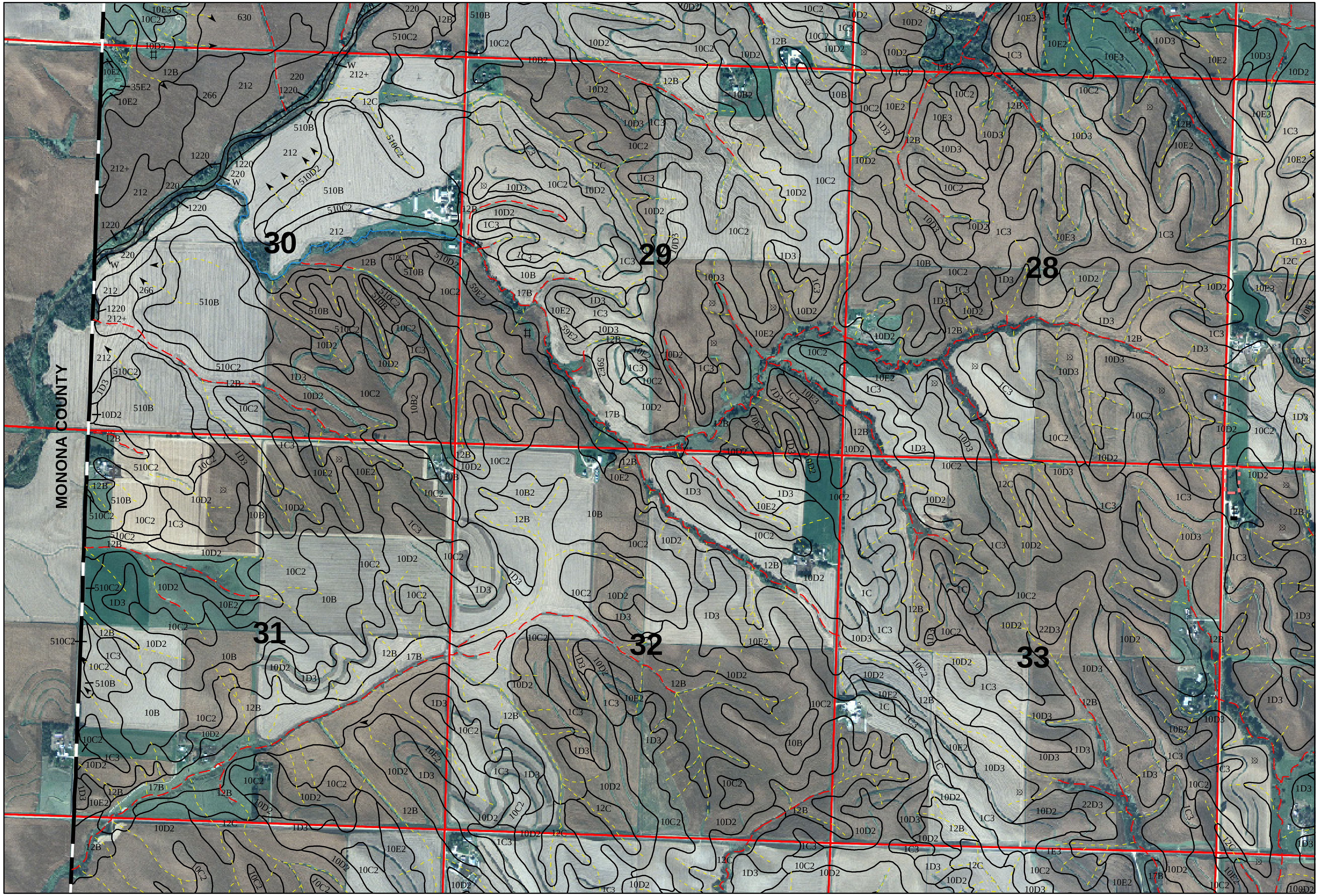
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 85N Range 41W

21

joins sheet 11



joins sheet 31

32

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

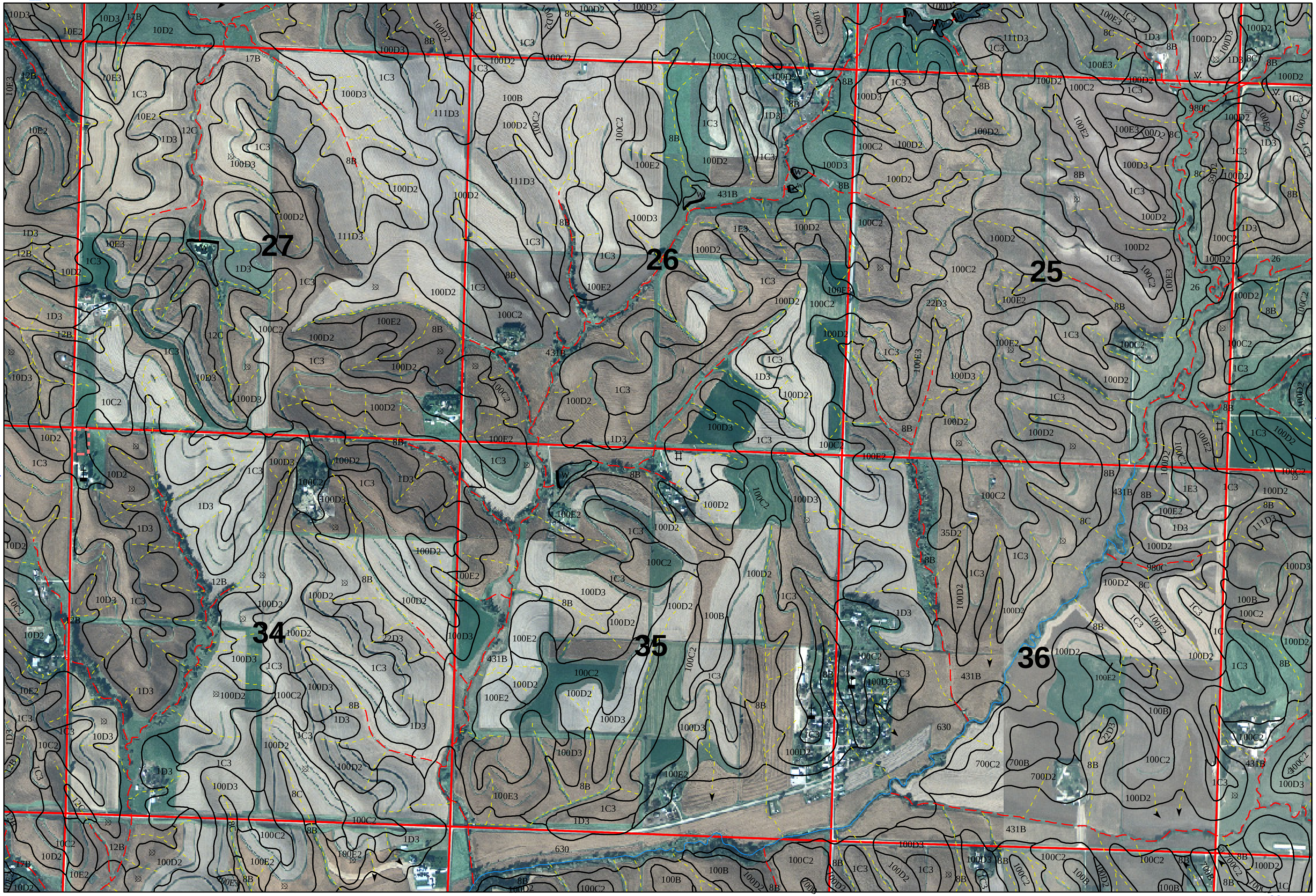
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 85N Range 41W

11

joins sheet 12

13



joins sheet 21

joins sheet 23

31

joins sheet 32

33

N

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 85N Range 40W

Soil Survey of Crawford County, Iowa

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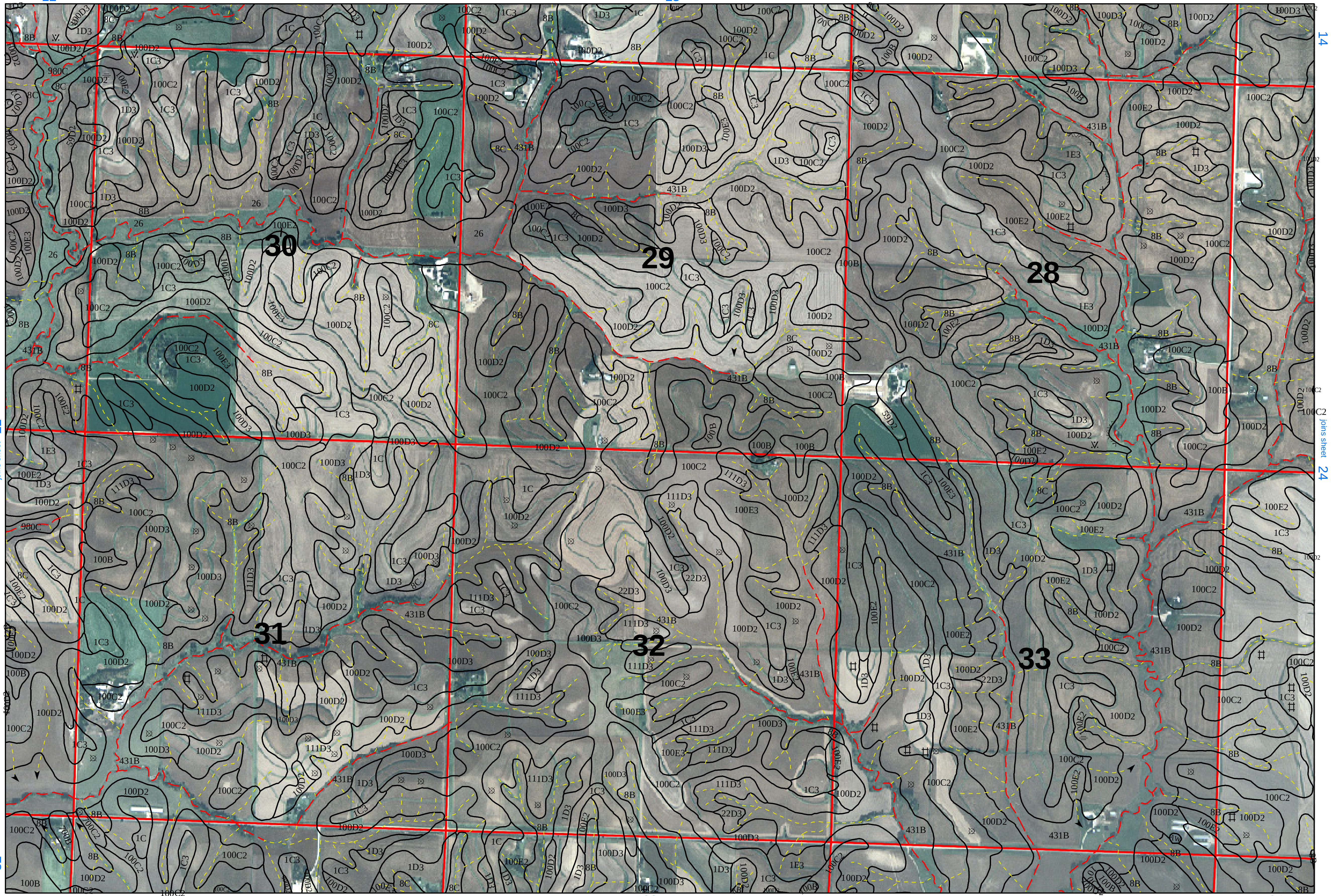
12

joins sheet 13

14

22 joins sheet

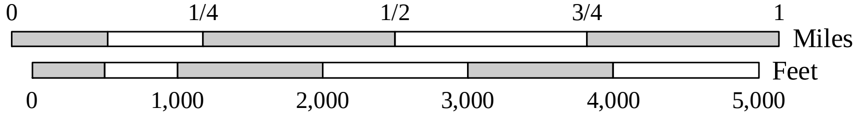
joins sheet 24



32

joins sheet 33

34



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United States Department of Agriculture
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Township 85N Range 40W

Soil Survey of Crawford County, Iowa

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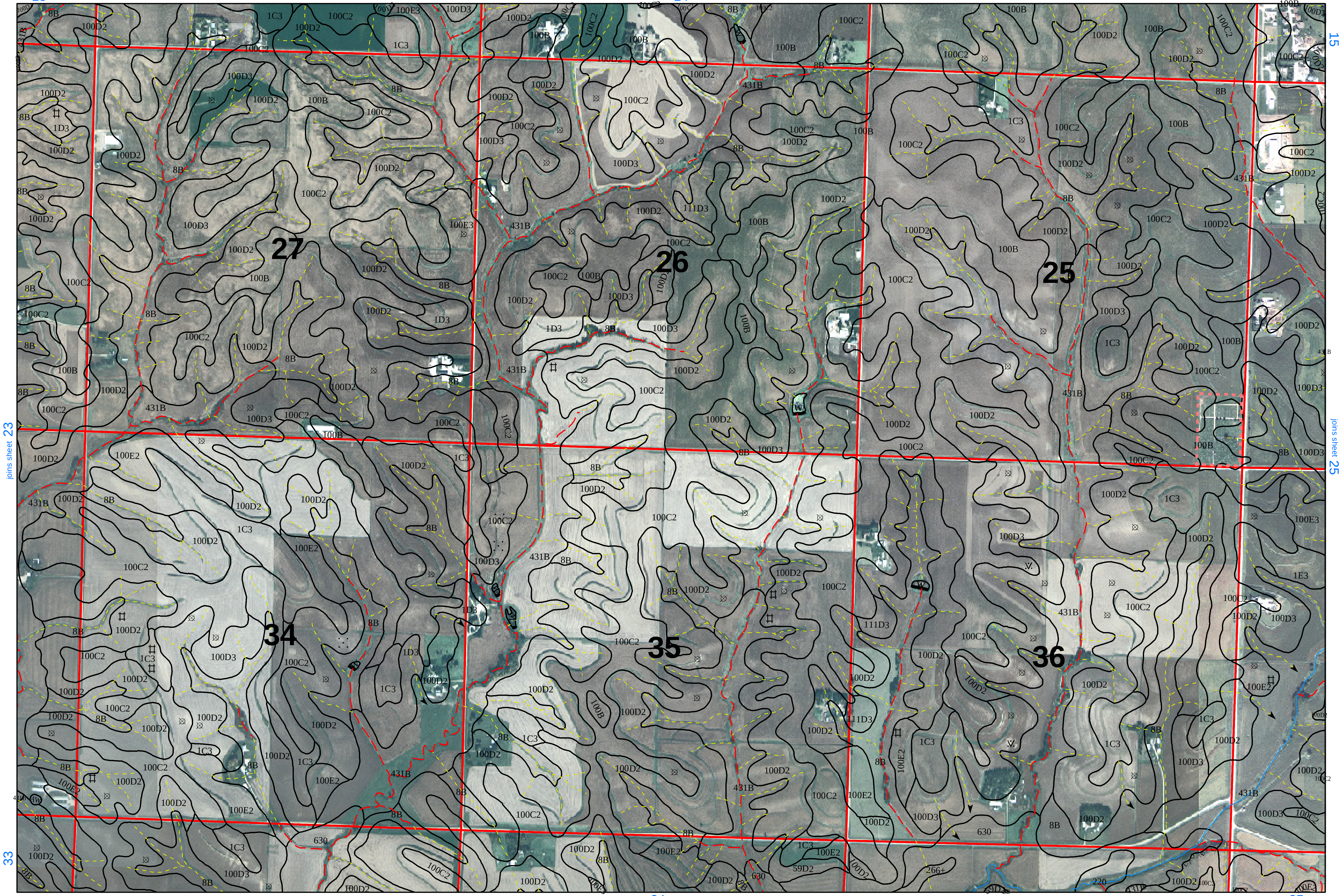

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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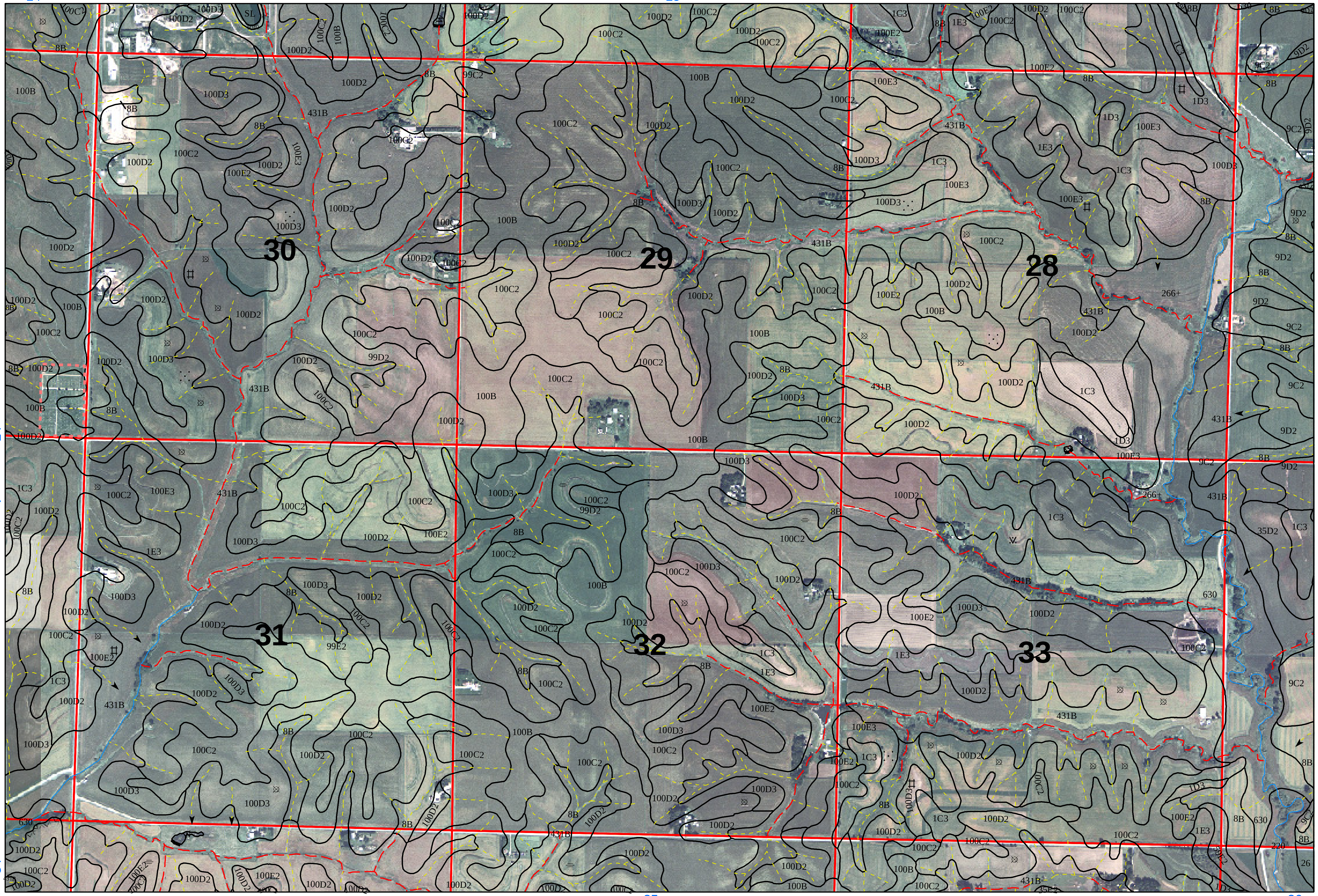
25

Township 85N Range 39W

25



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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

0 1/4 1/2 3/4 1 Miles

Feet 0 1,000 2,000 3,000 4,000 5,000

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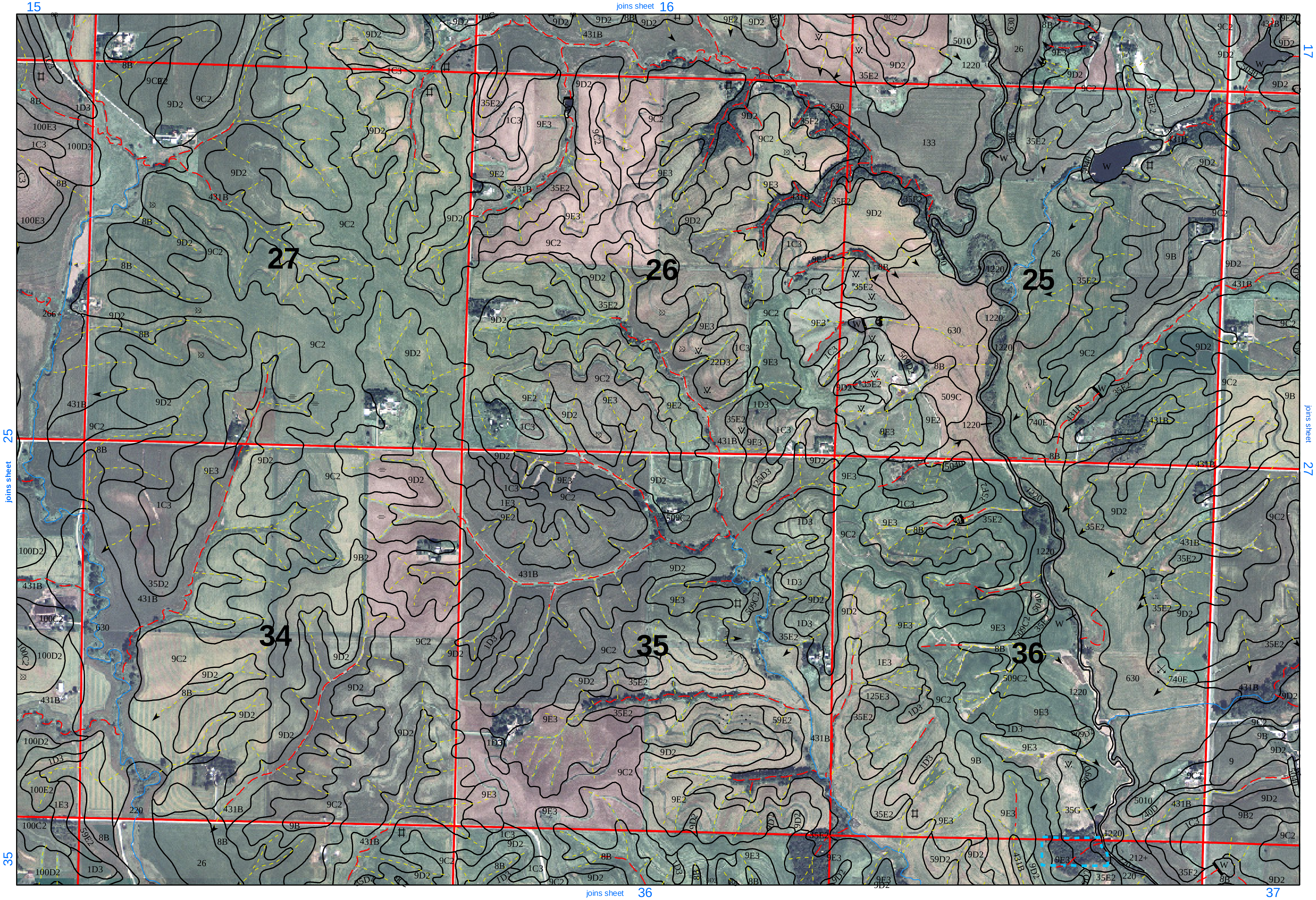
Township 85N Range 39W



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 85N Range 38W

27

27

Soil Survey of Crawford County, Iowa

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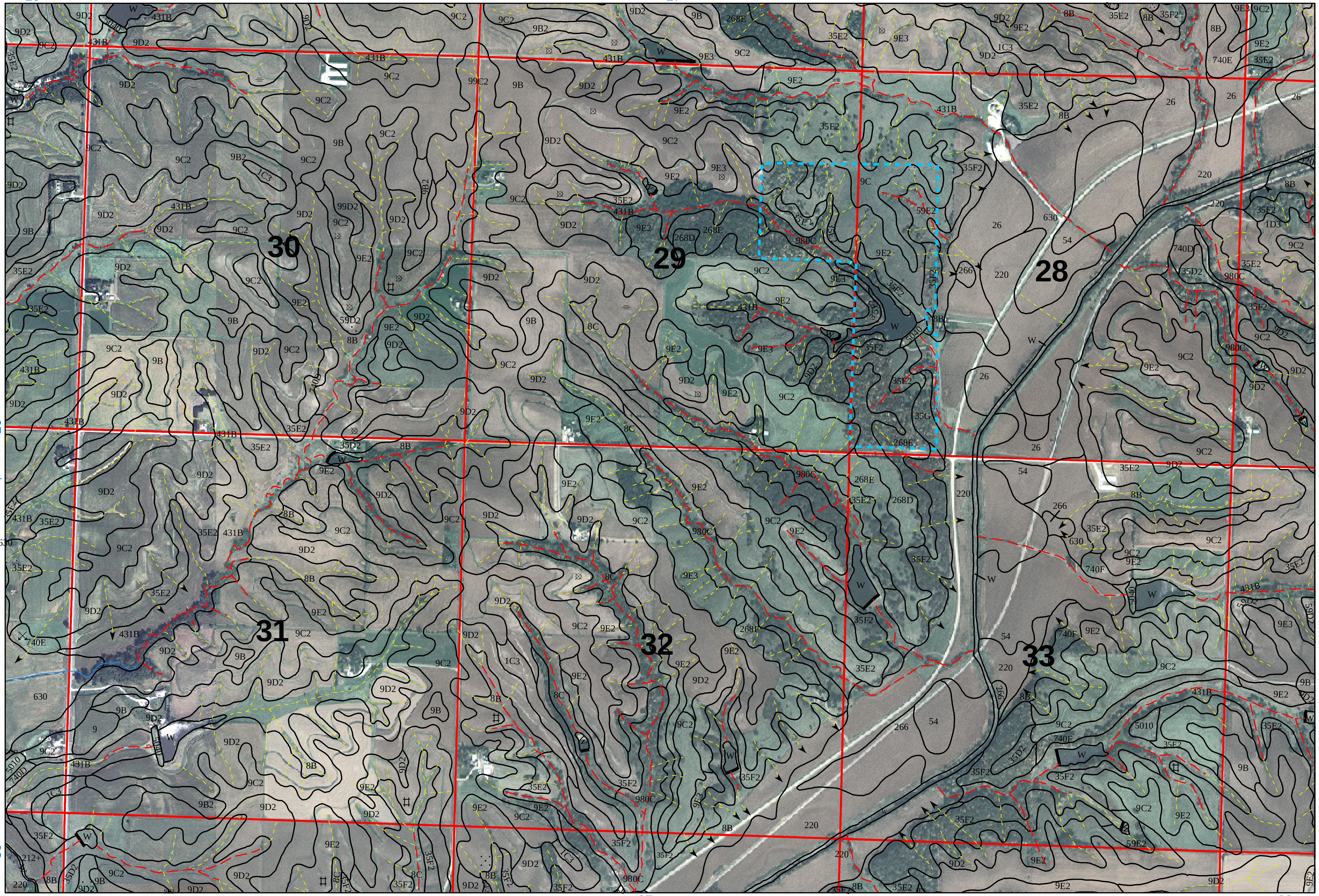
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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28

Township 85N Range 38W

28

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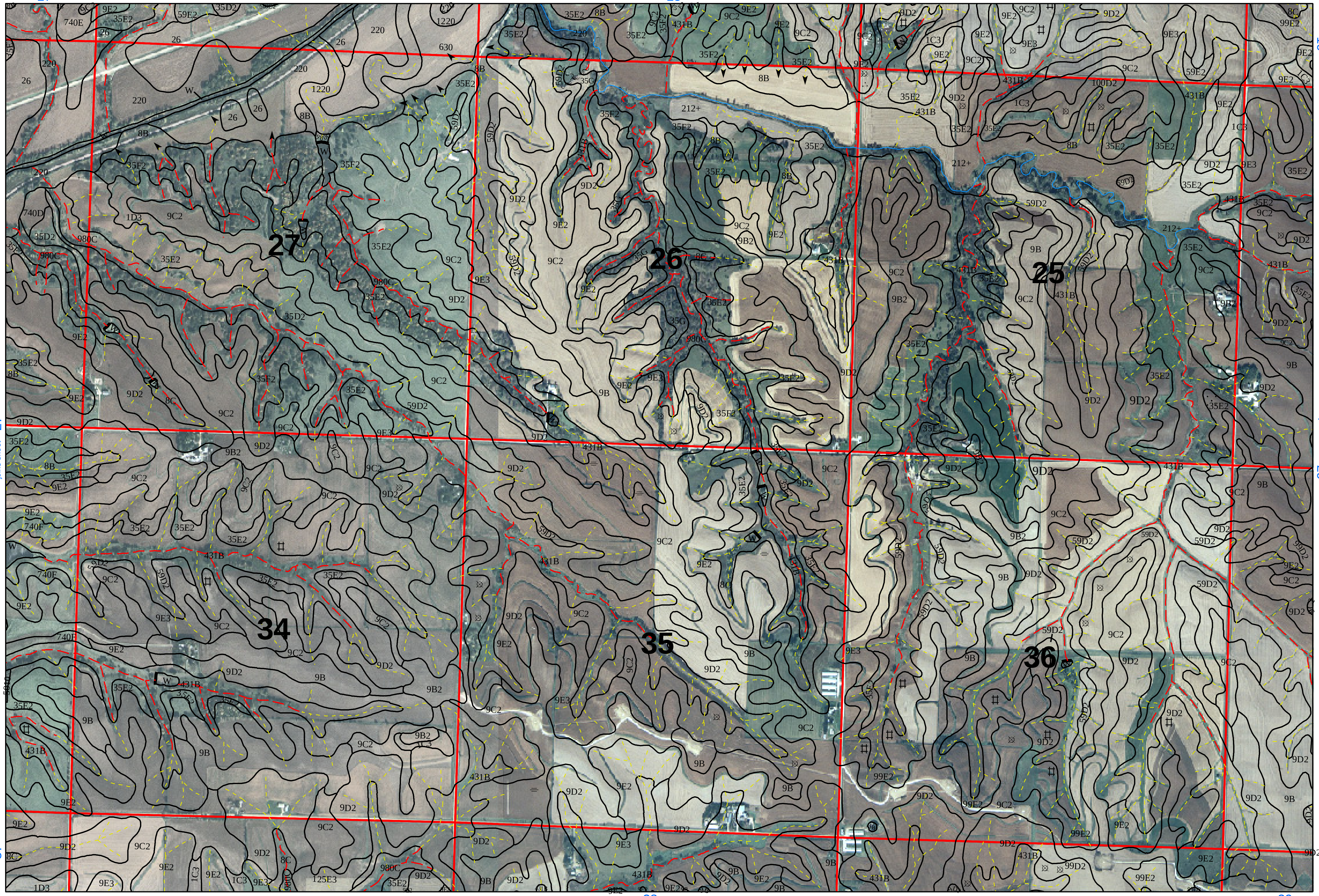
North American Datum of 1983 (NAD83), GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 85N Range 37W

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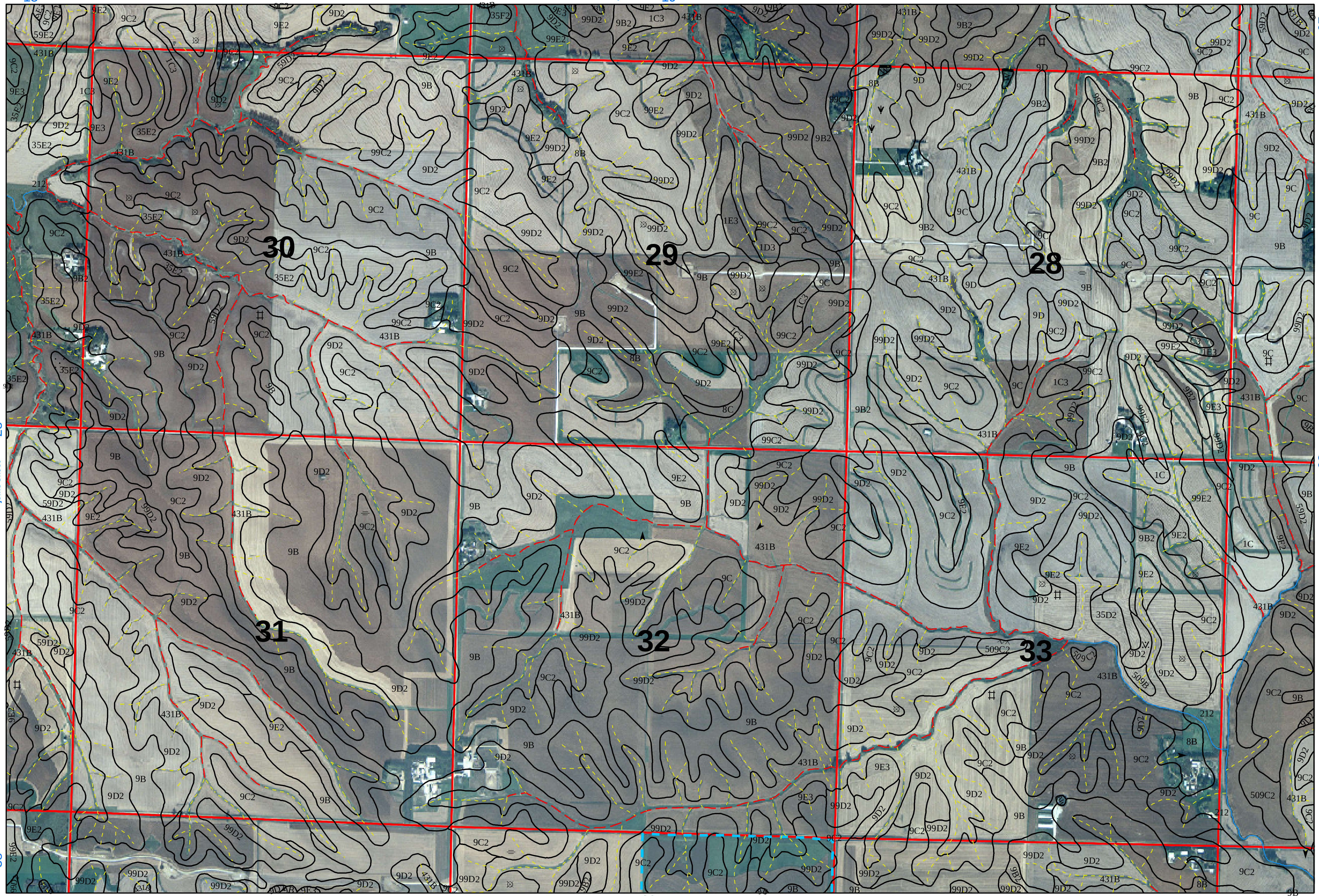

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
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30

Township 85N Range 37W

Soil Survey of Crawford County, Iowa

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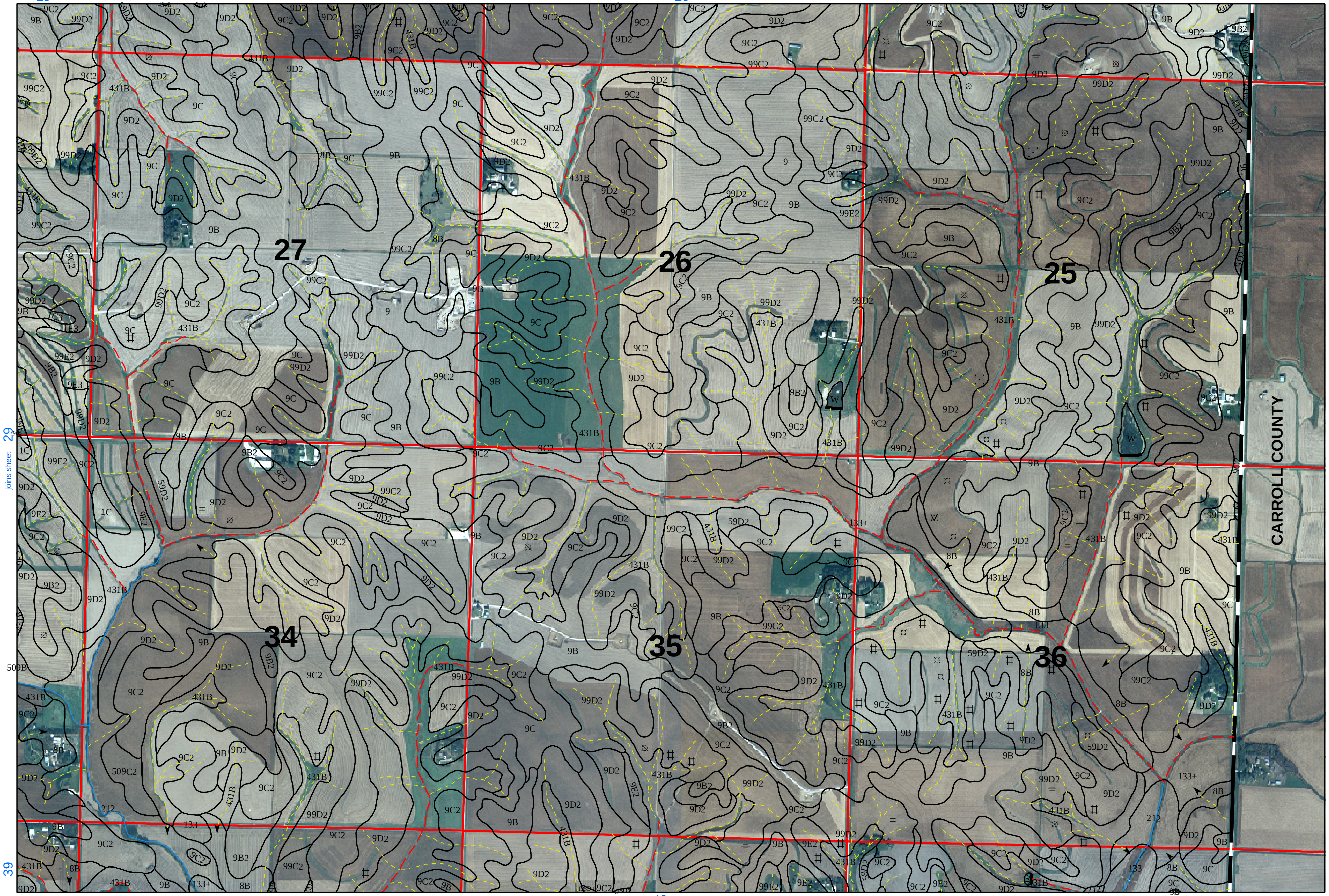

0	1/4	1/2	3/4	1 Miles

0	1,000	2,000	3,000	4,000	5,000 Feet

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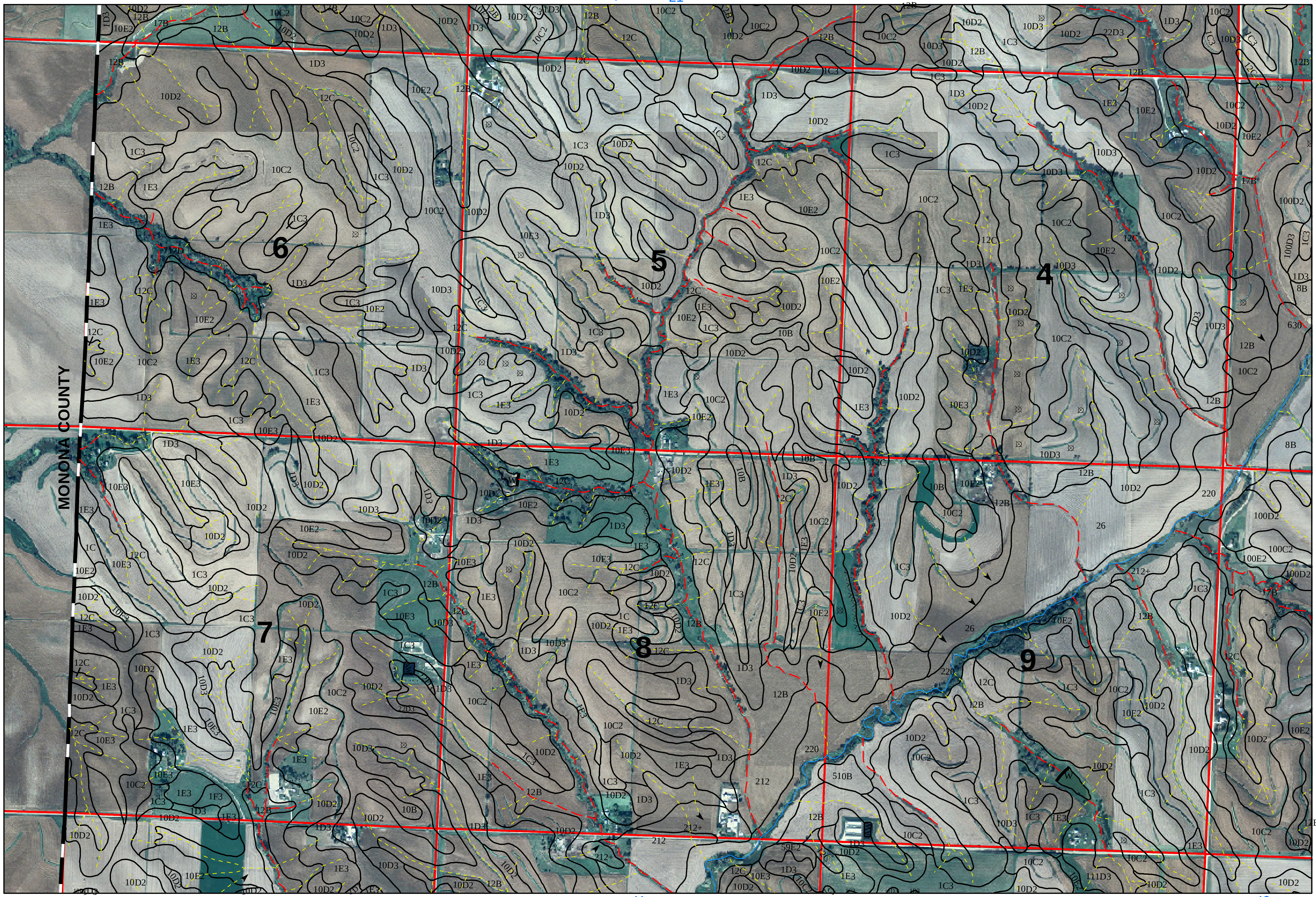
United States Department of Agriculture
NRCS Natural Resources Conservation Service

31

Township 84N Range 41W

31

joins sheet 21



22

joins sheet 32

joins sheet 41

42

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

Miles	0	1/4	1/2	3/4	1
Feet	0	1,000	2,000	3,000	4,000	5,000

N

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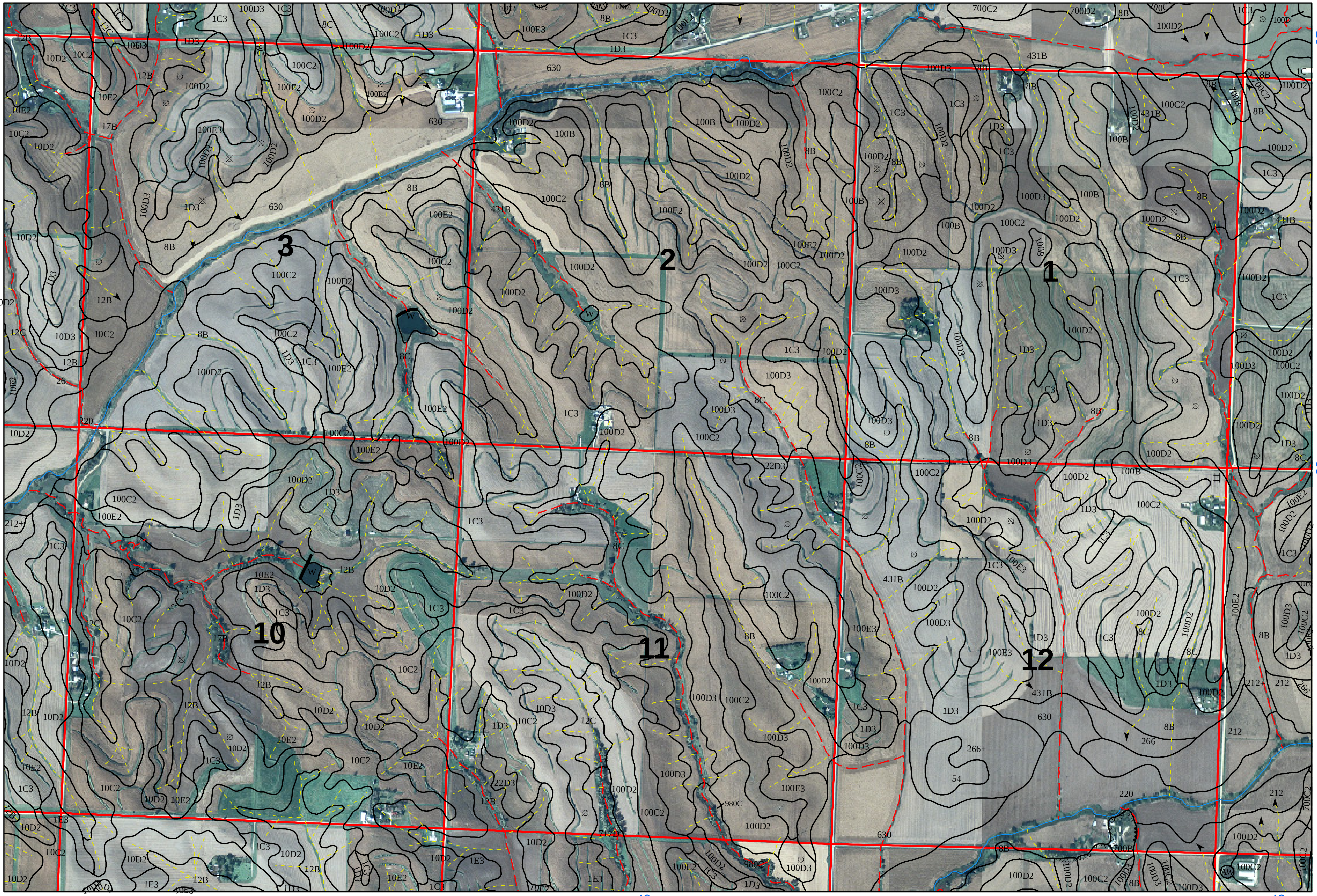
United States Department of Agriculture
NRCS Natural Resources Conservation Service

32

Township 84N Range 41W

32

joins sheet 22



21

23

joins sheet 31

joins sheet 33

41

joins sheet 42

43

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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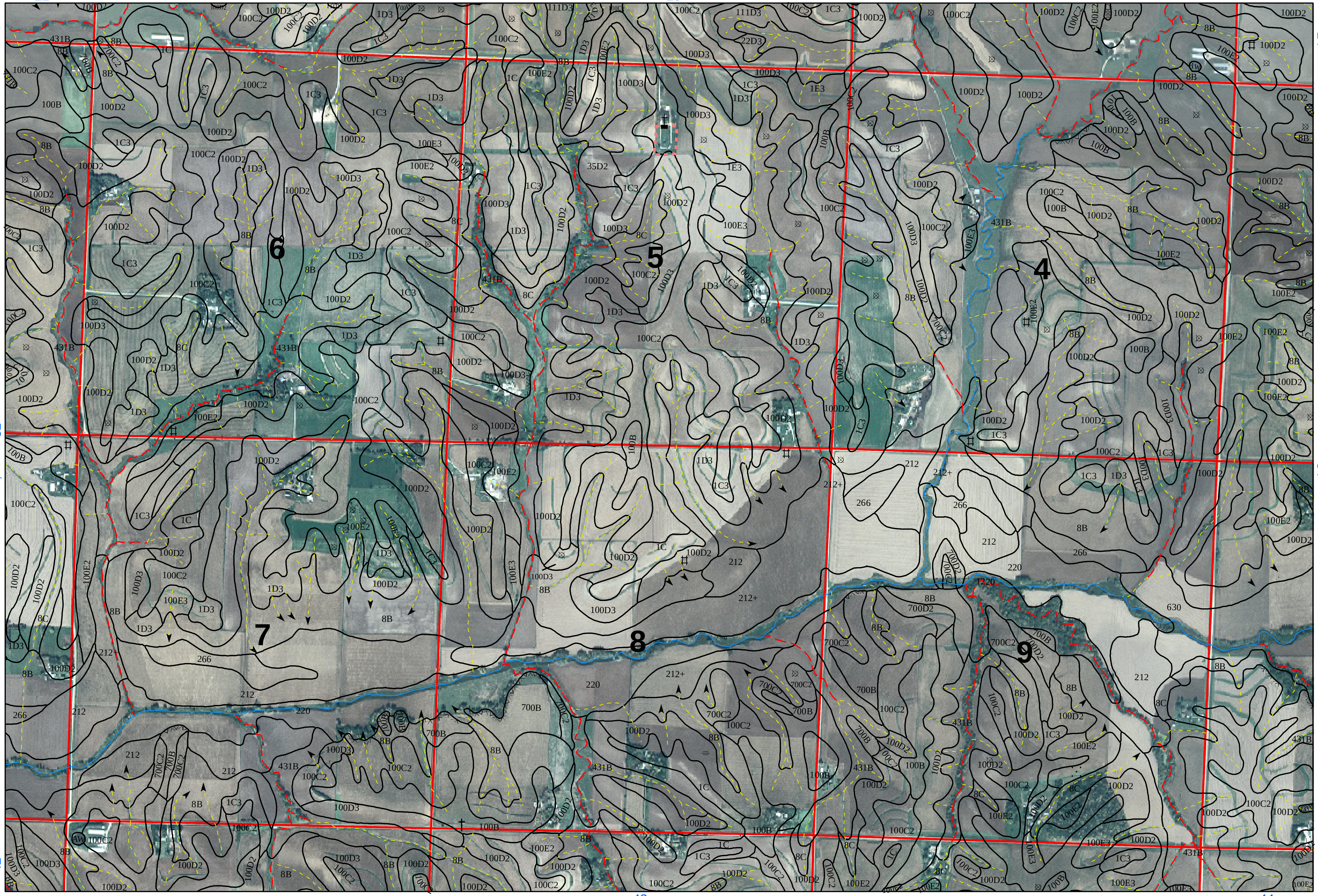
United States Department of Agriculture
NRCS Natural Resources Conservation Service

33

Township 84N Range 40W

33

22 joins sheet 23 24



joins sheet 32

joins sheet 34

42 joins sheet 43 44

N

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0 1/4 1/2 3/4 1 Miles

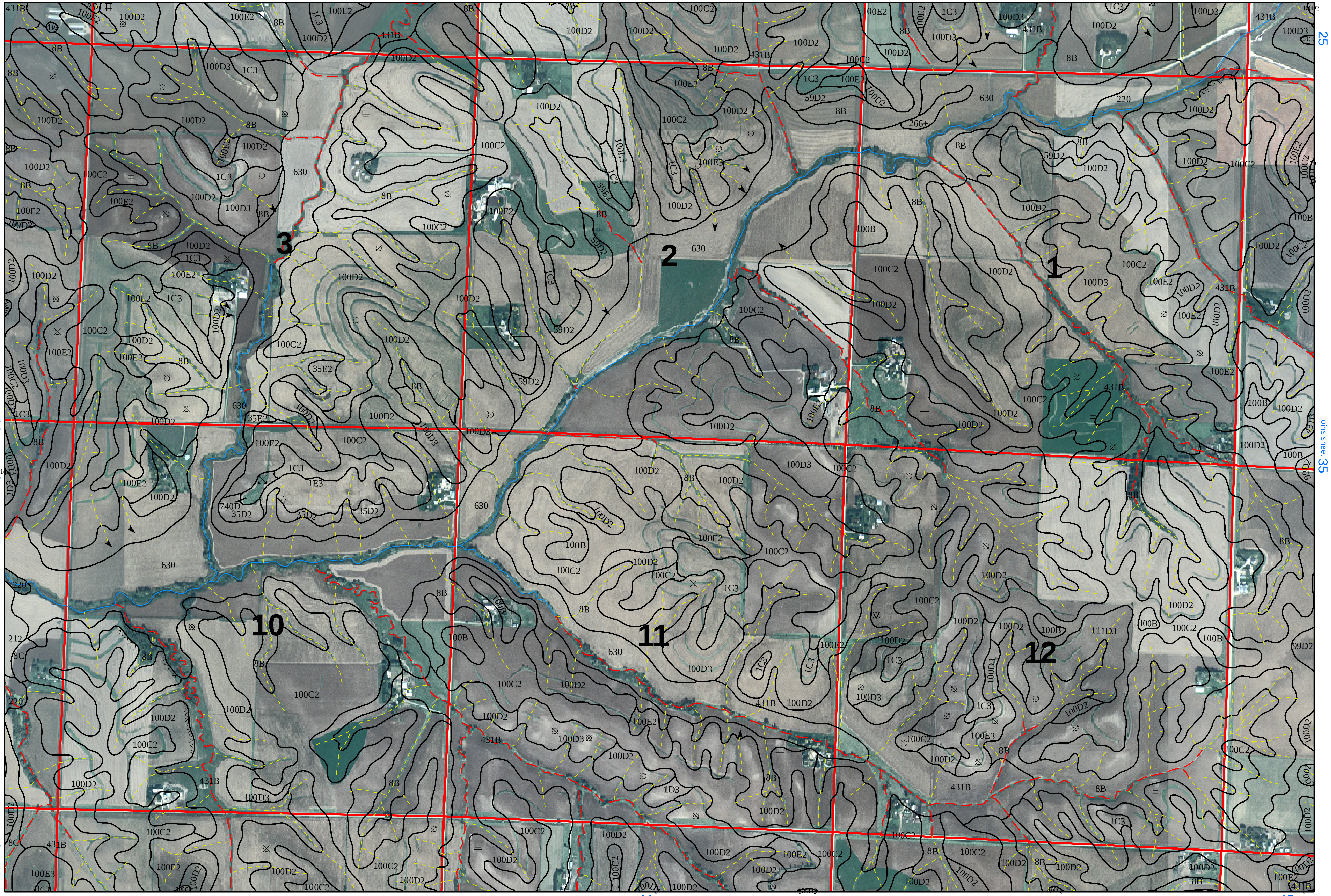
0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 40W

34

34



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 84N Range 39W

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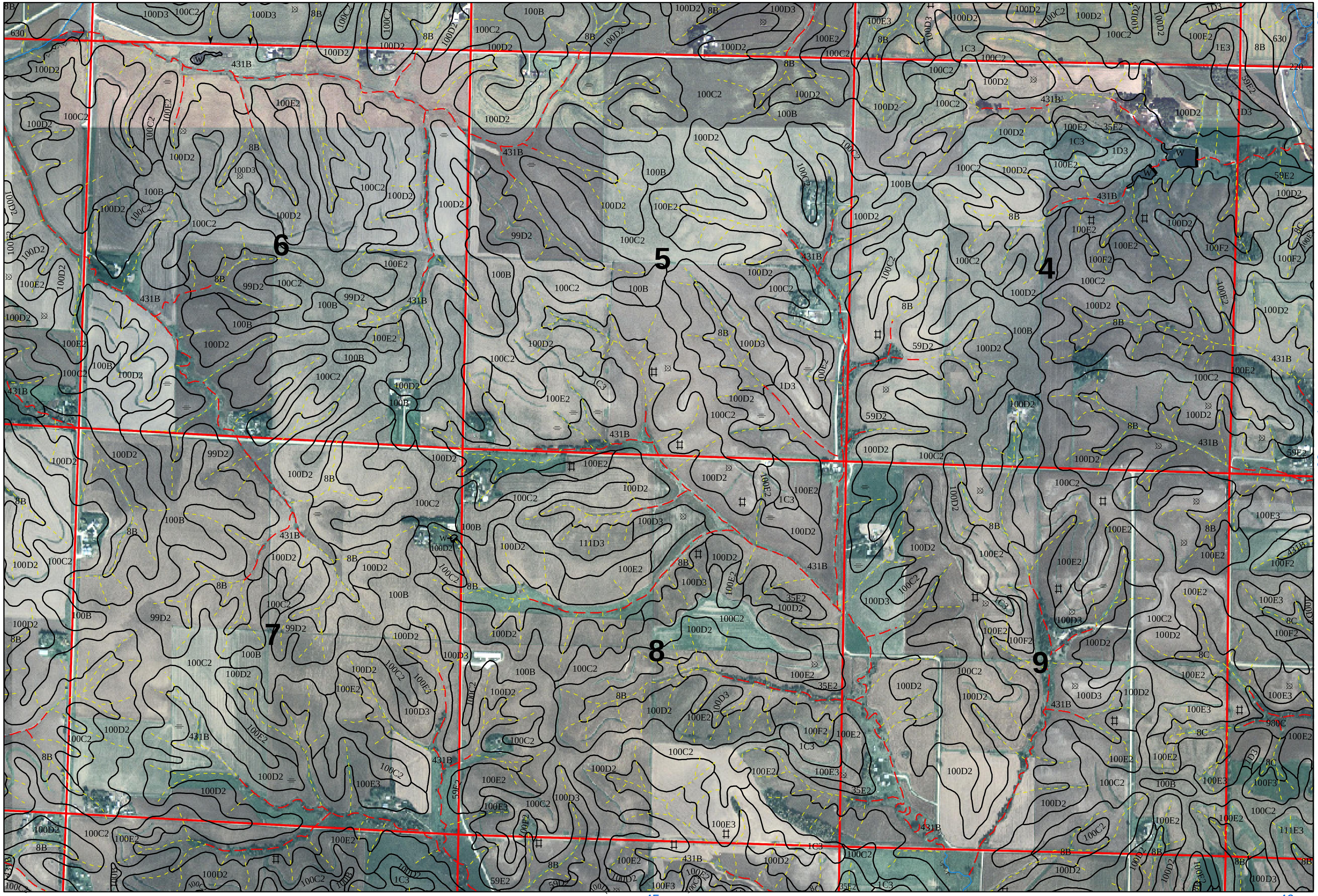

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0 1/4 1/2 3/4 1 Miles

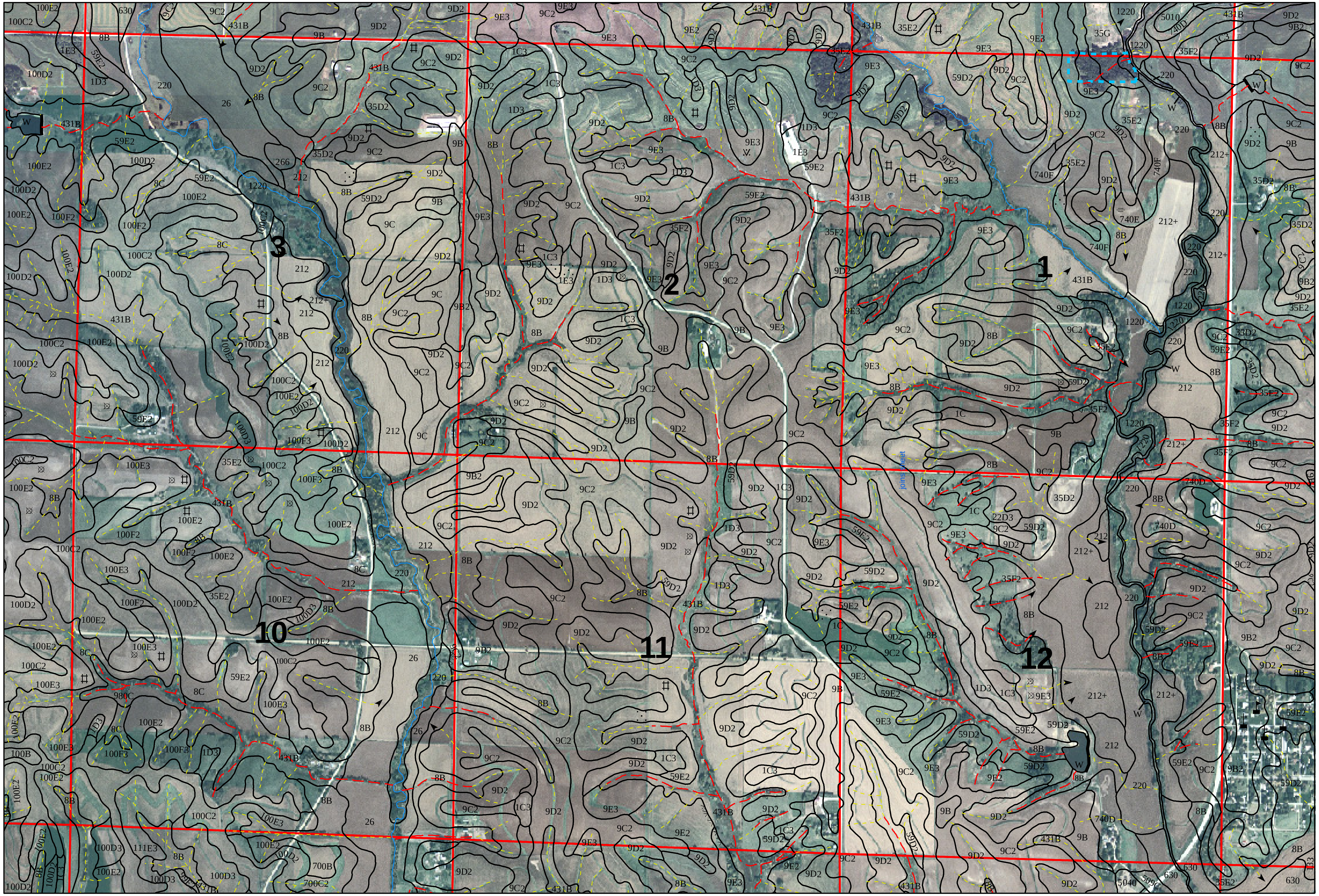
0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 39W

36



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 38W

37

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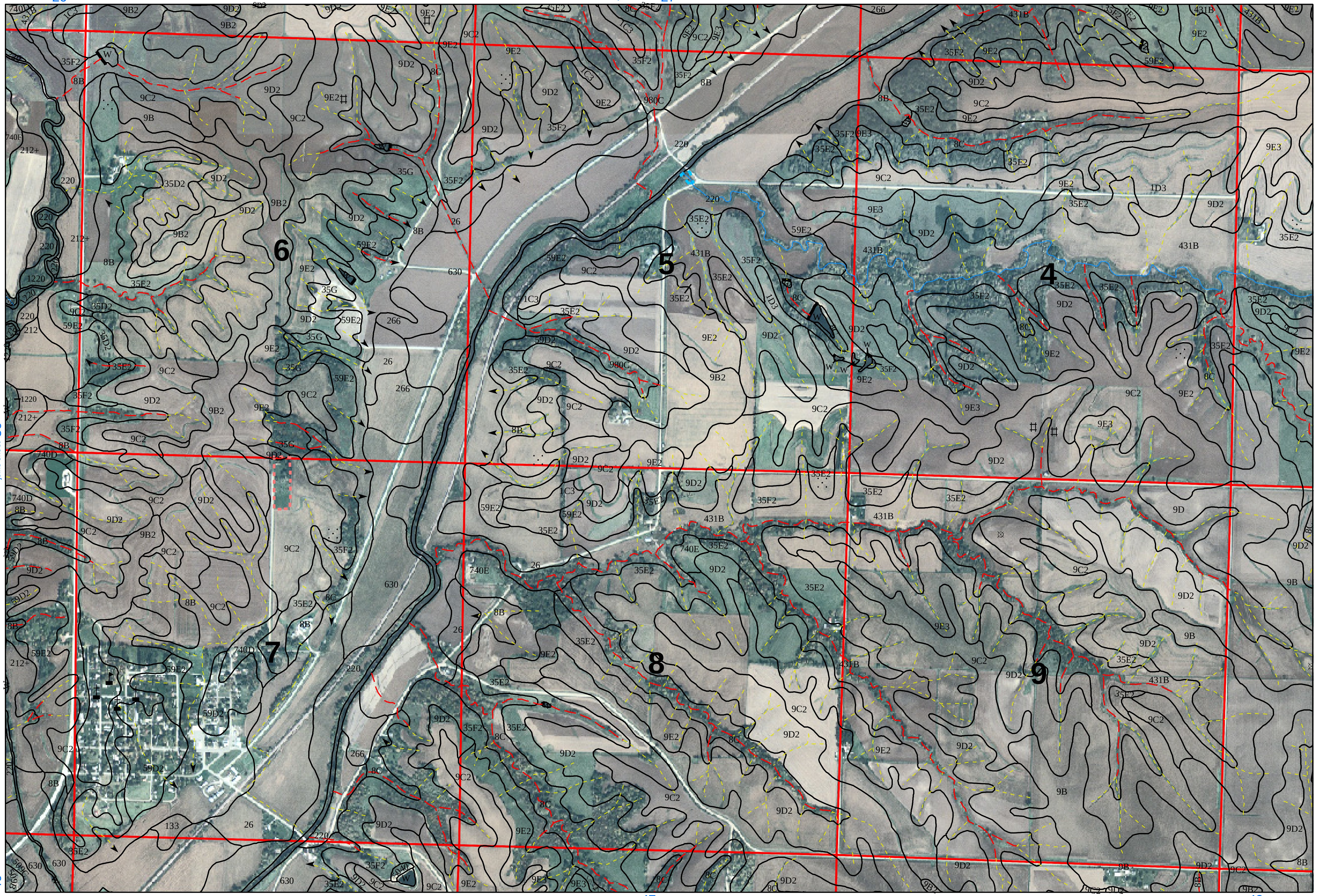
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

26 joins sheet 27 28

joins sheet 36

joins sheet 38



46 joins sheet 47 48

N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 84N Range 38W

38

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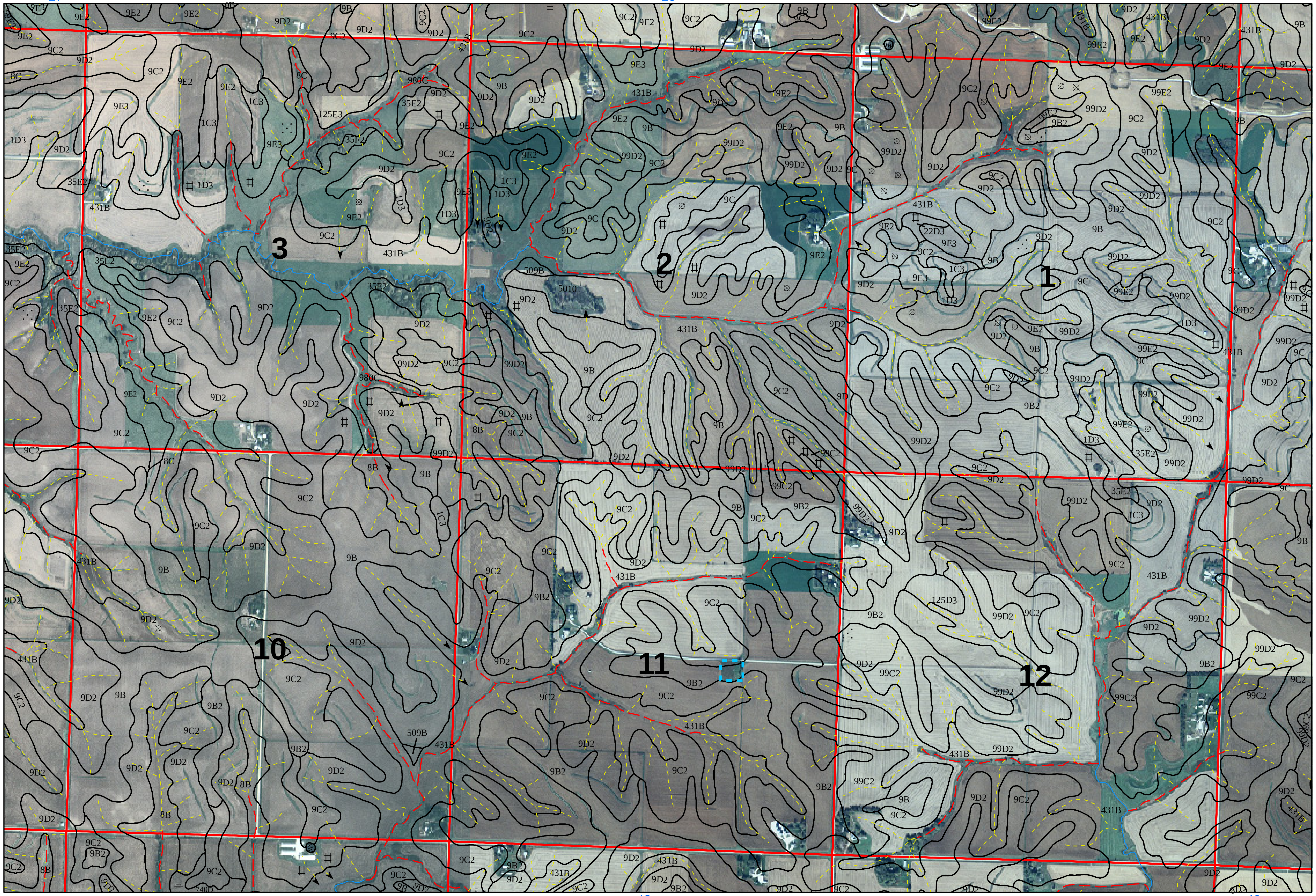
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

27
joins sheet 28
29
joins sheet 37
joins sheet 39
47
joins sheet 48
49



N

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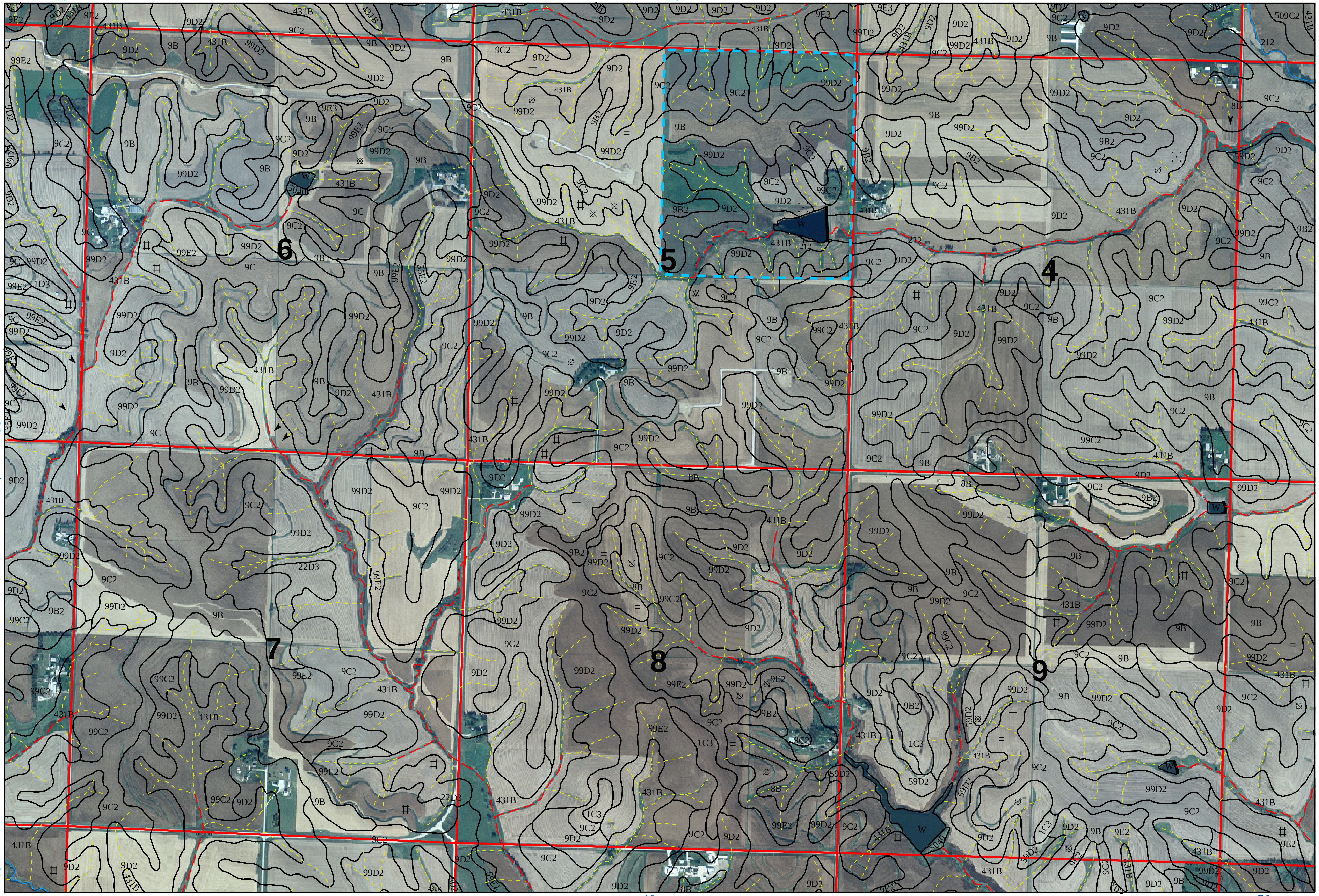
0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

Township 84N Range 37W

28 joins sheet 29



30 joins sheet 40 joins sheet 38 48 joins sheet 49 50

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 37W

40

29
joins sheet 30

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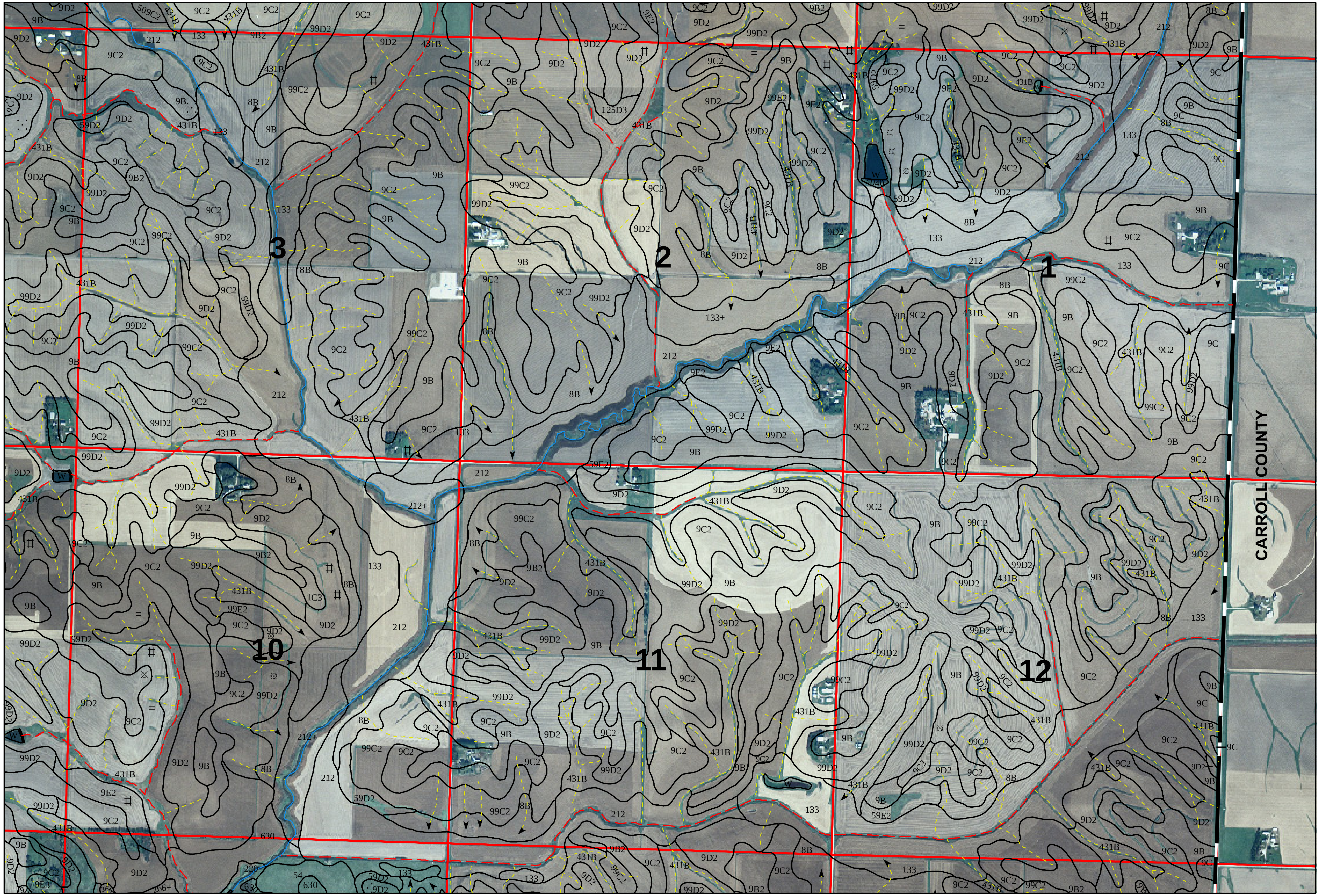
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

joins sheet 39



49
joins sheet 50

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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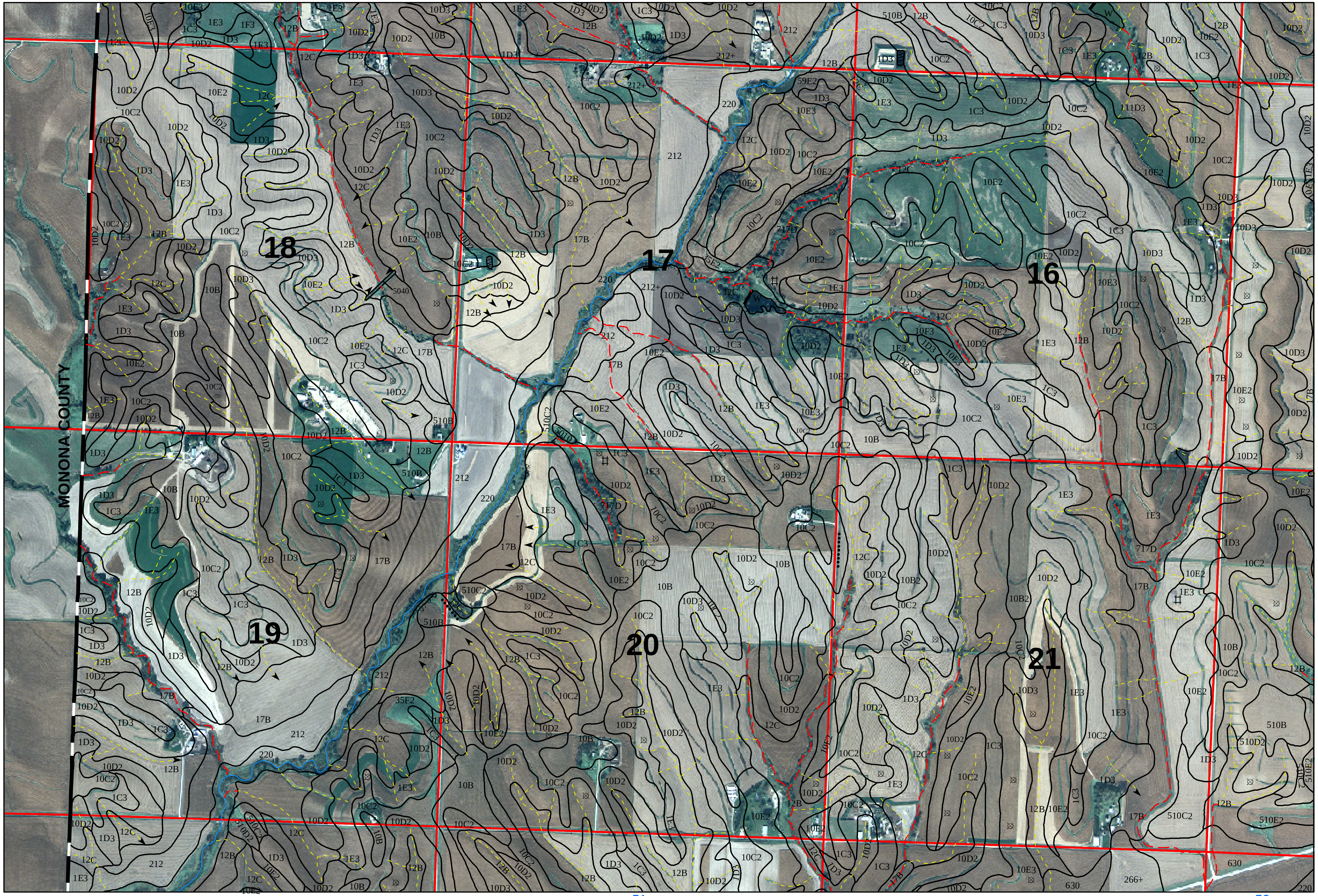
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 41W

joins sheet 31



joins sheet 51

52

Soil Survey of Crawford County, Iowa

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SSURGO certified soil tabular and spatial data.

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

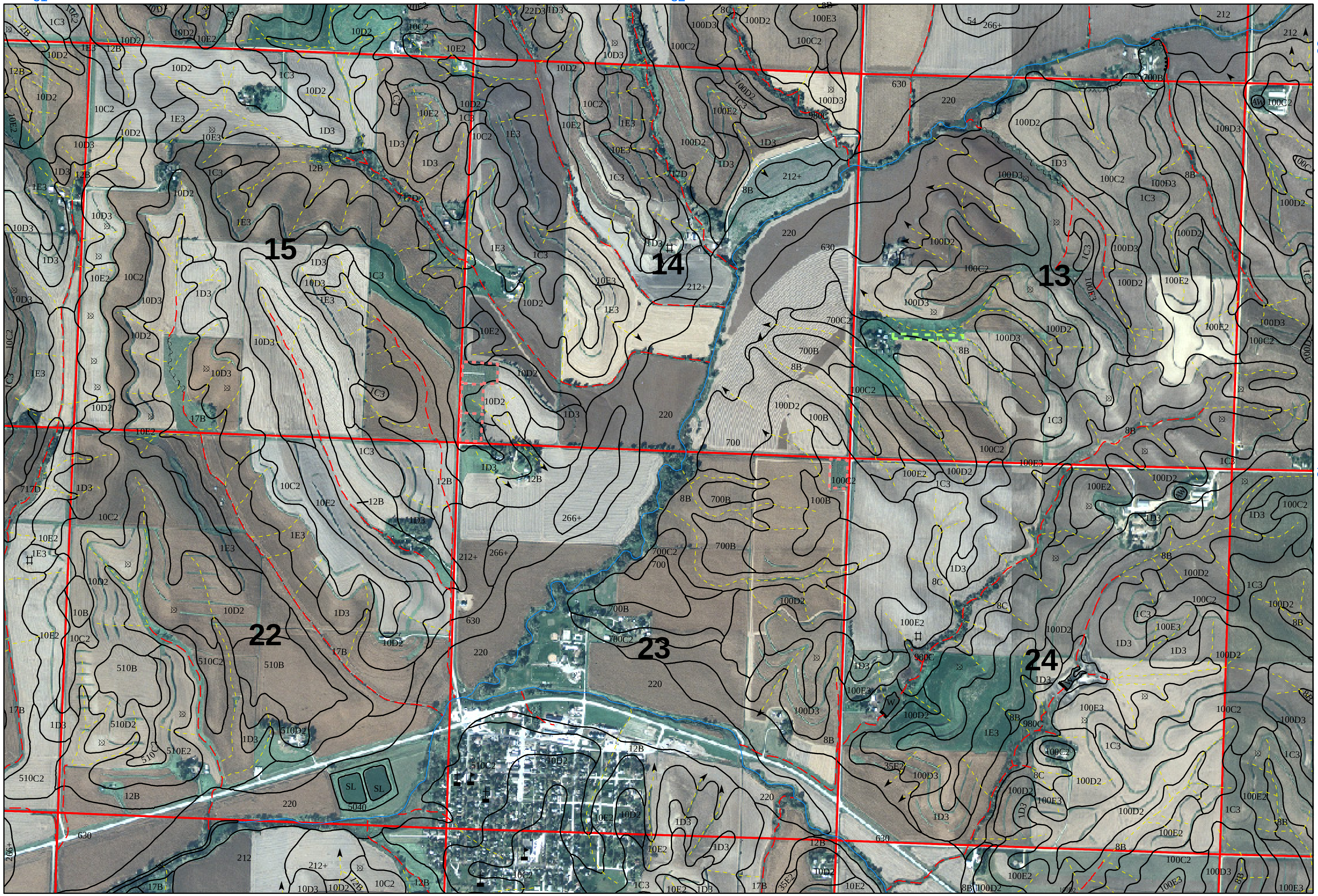
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 41W

joins sheet 32

31

33



joins sheet 41

joins sheet 43

51

joins sheet 52

53

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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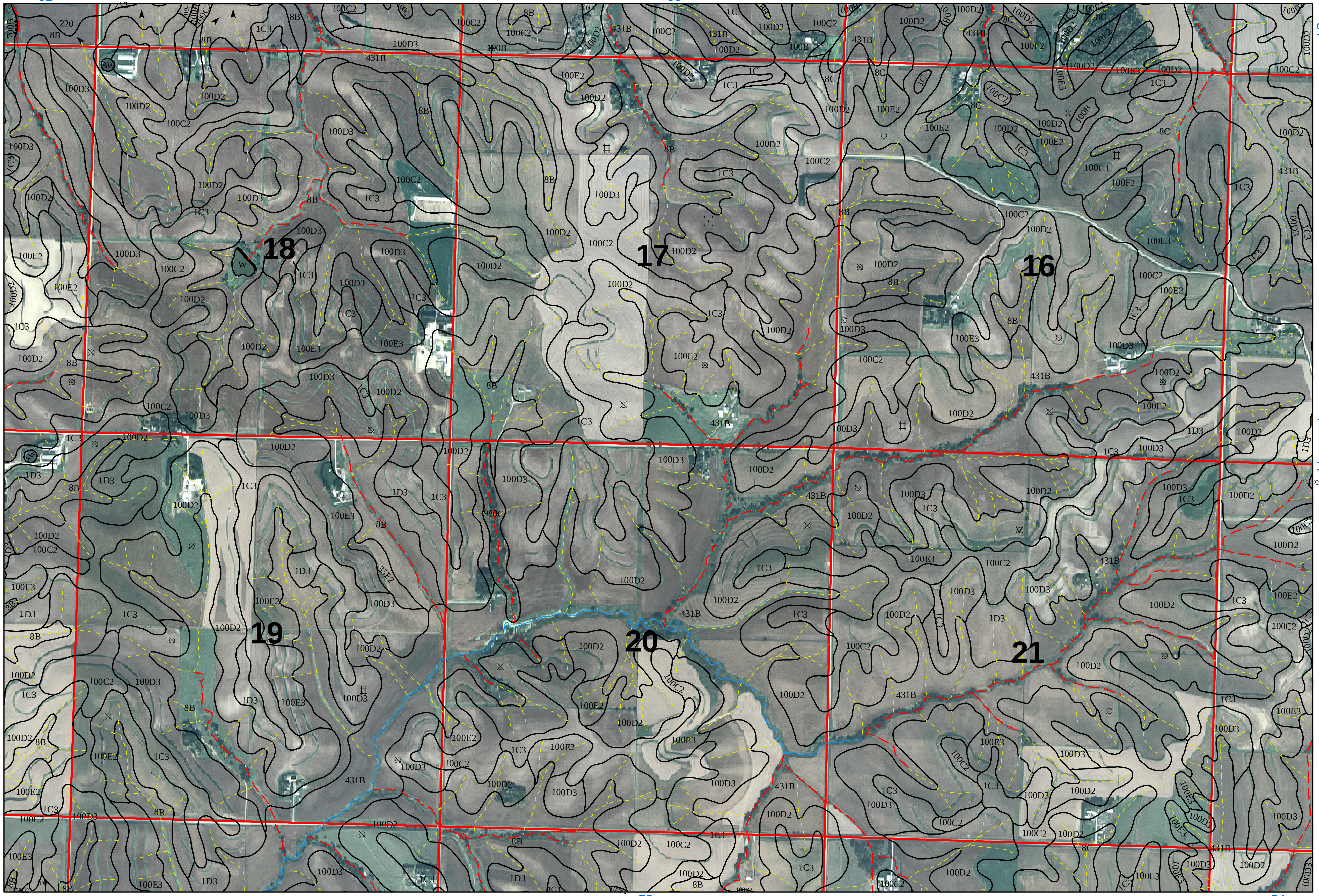
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 40W

32
joins sheet 33
34
joins sheet 42
joins sheet 44
52
joins sheet 53
54



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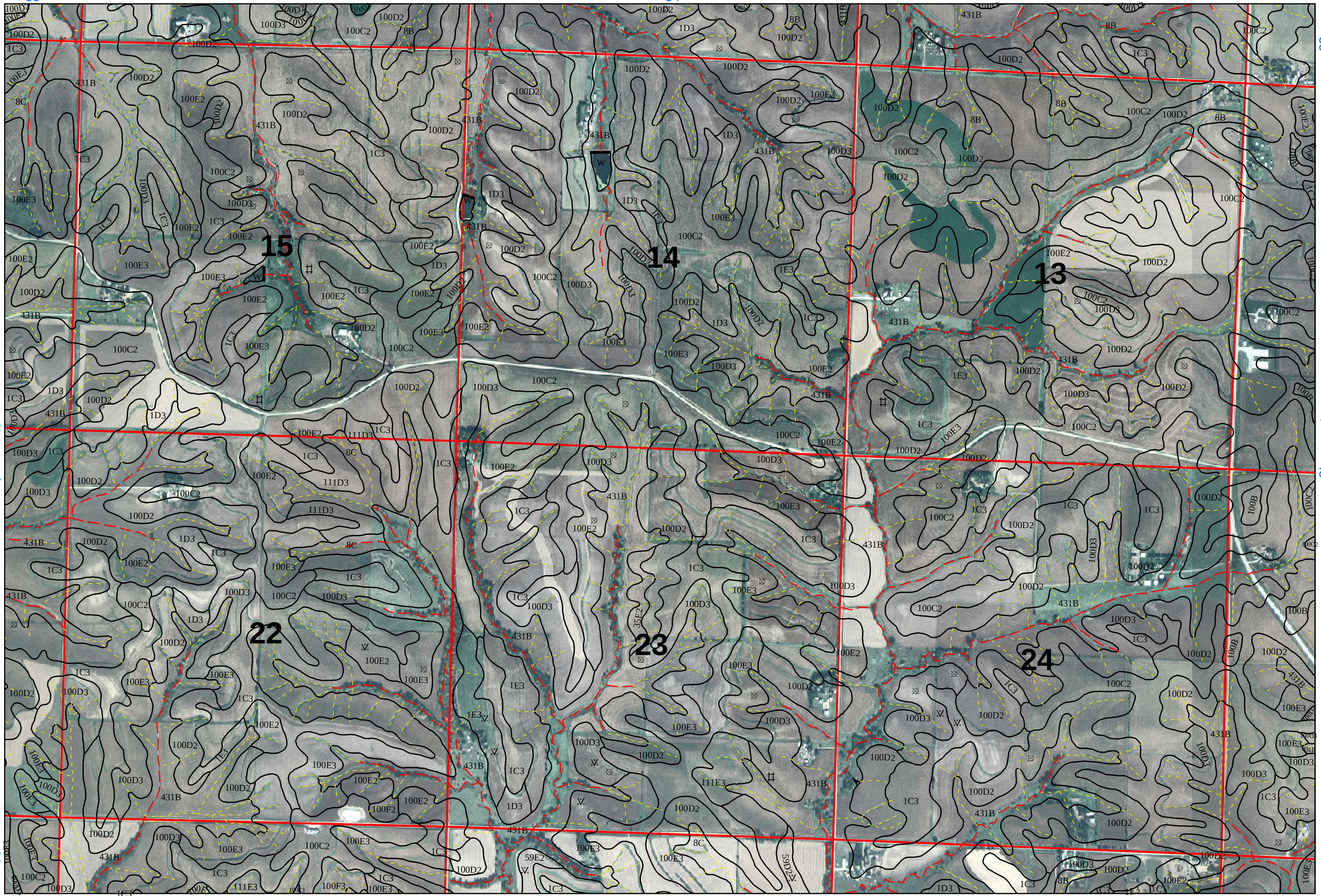
0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 40W



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 39W

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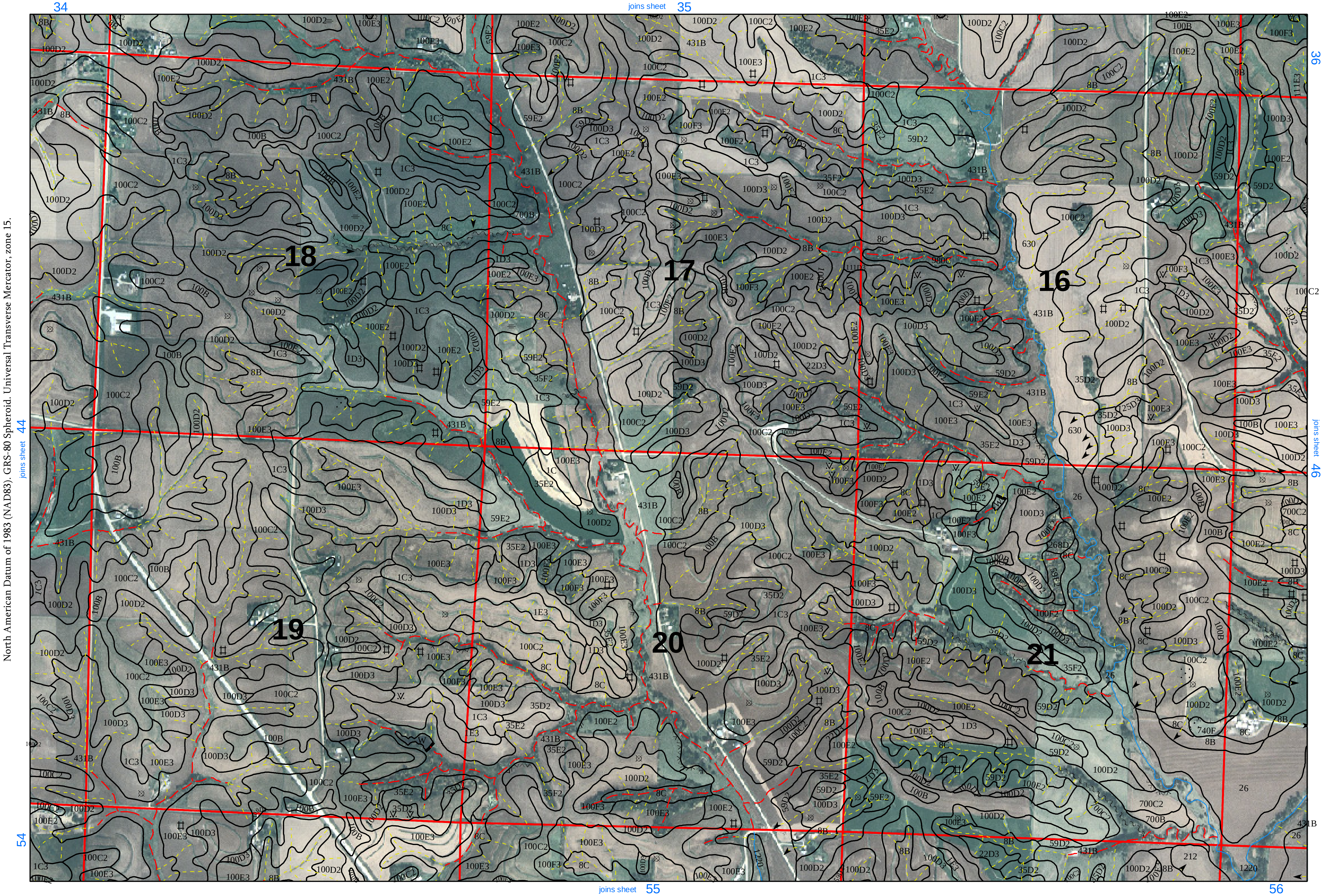

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 84N Range 39W

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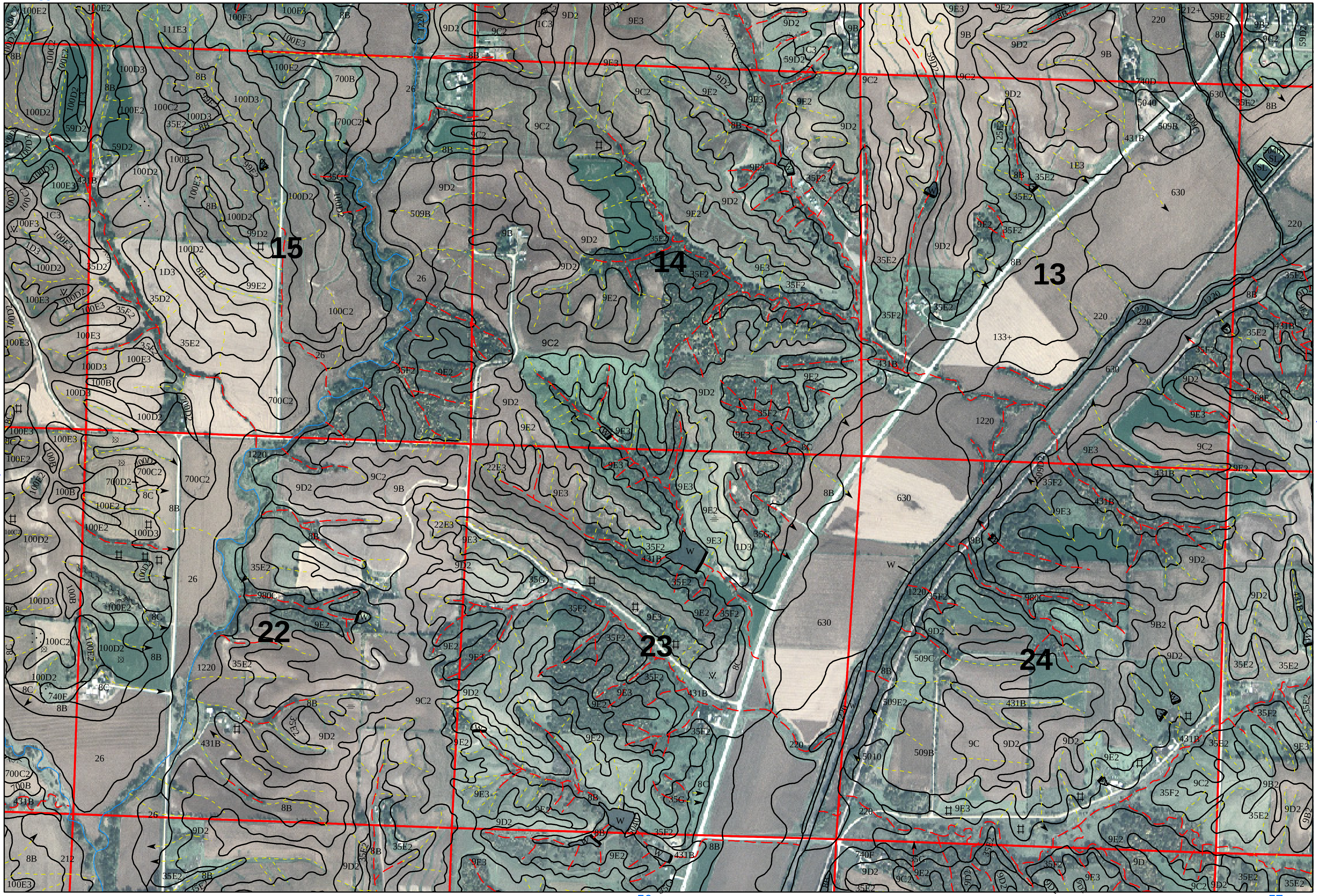

0 1/4 1/2 3/4 1 Miles
0 1,000 2,000 3,000 4,000 5,000 Feet

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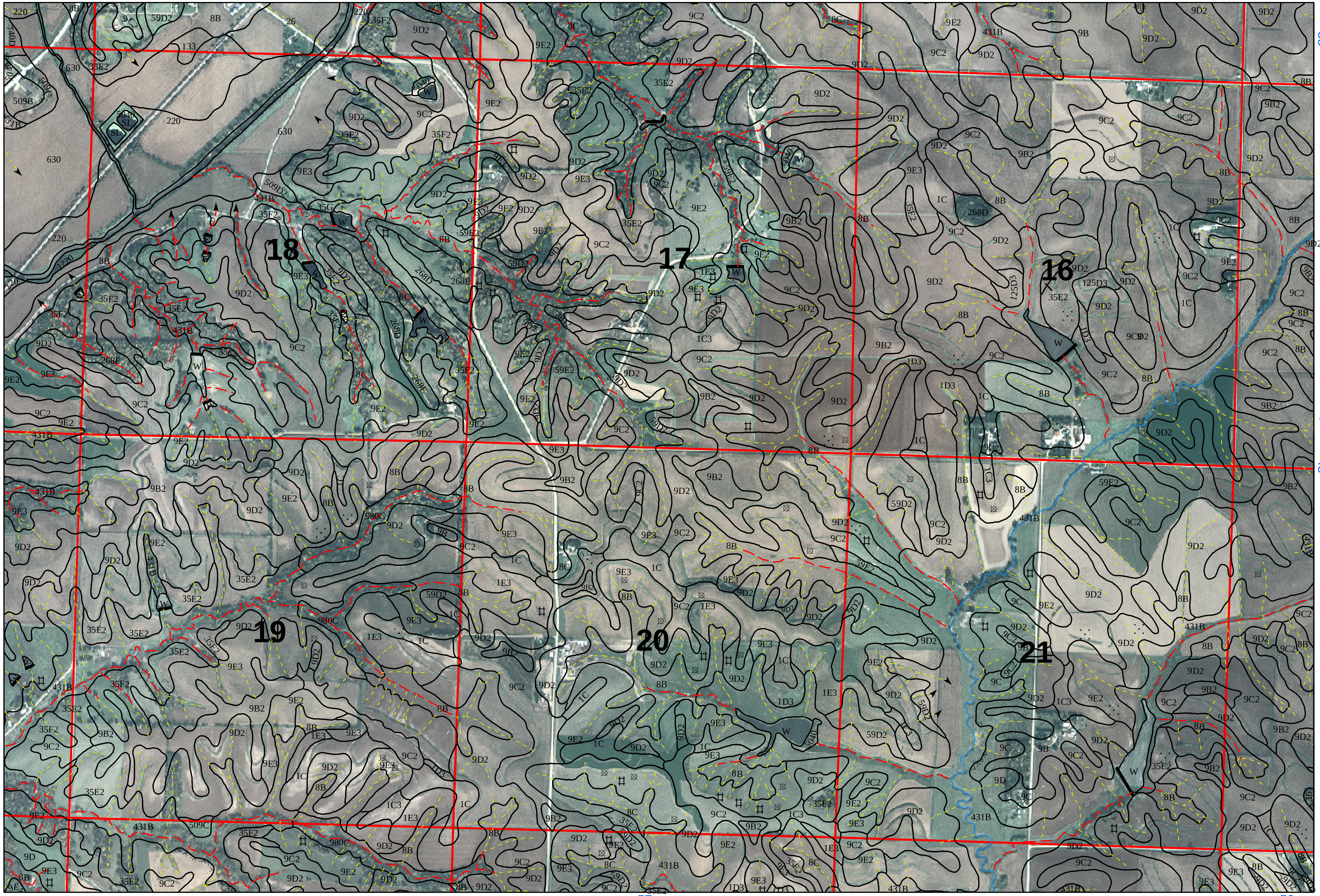
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 38W

36 joins sheet 37 38



joins sheet 46 joins sheet 48

56 joins sheet 57 58

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0 1/4 1/2 3/4 1 Miles

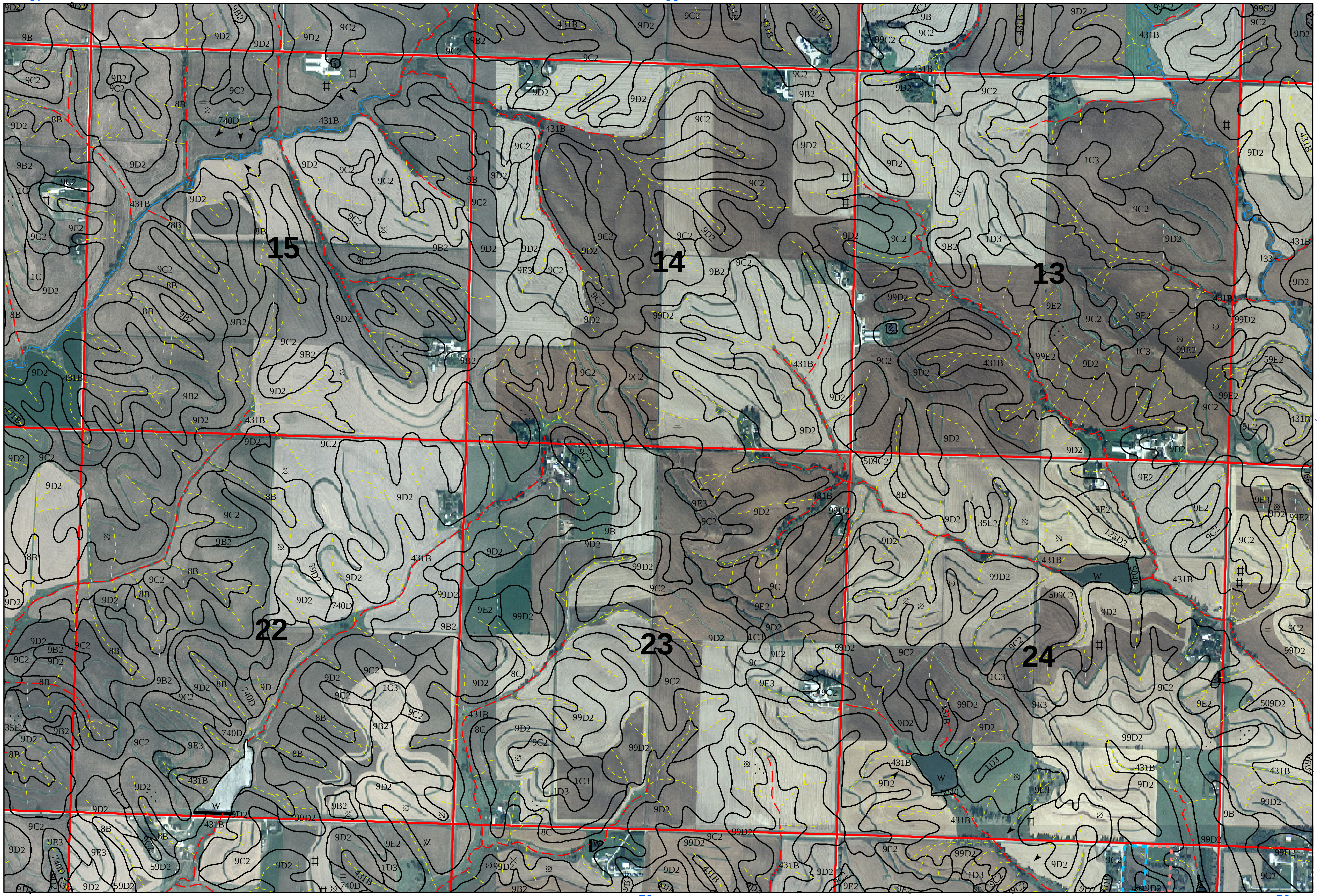
0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 38W

48



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 37W

49

Soil Survey of Crawford County, Iowa

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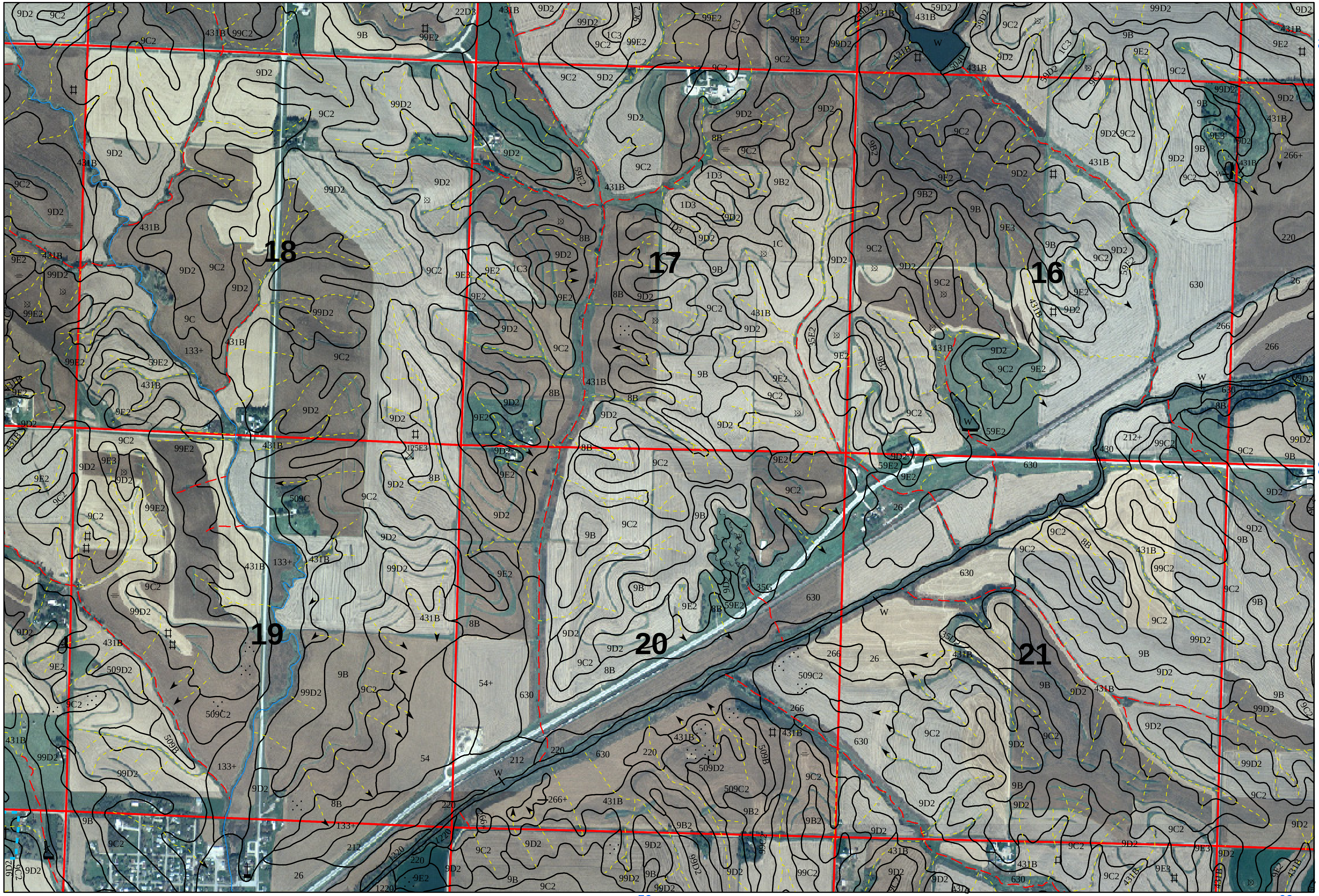
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

38 joins sheet 39 40

joins sheet 48



joins sheet 50

58 joins sheet 59 60

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 37W

50

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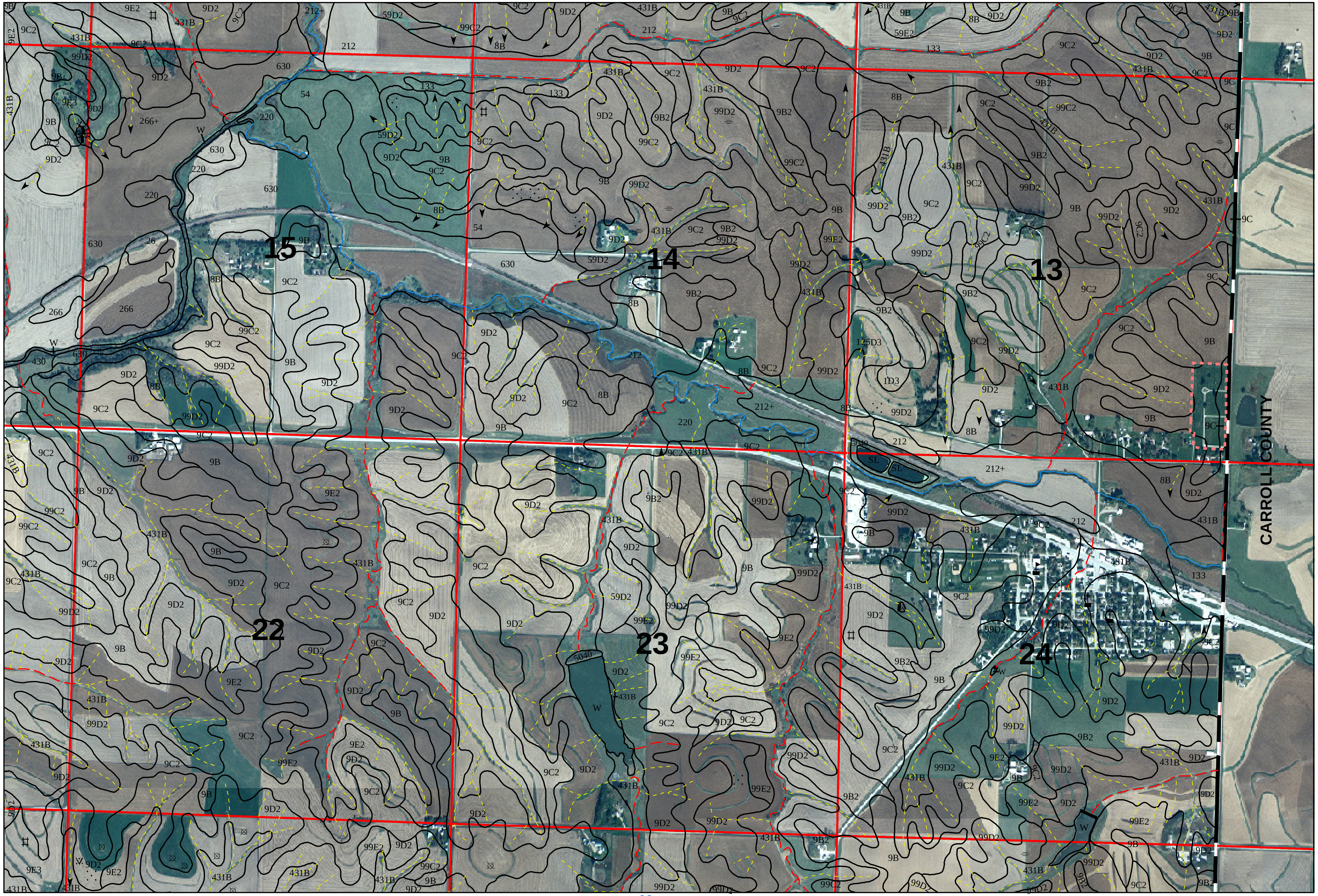
39
joins sheet 40
joins sheet 49
59
joins sheet 60



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0 1/4 1/2 3/4 1 Miles

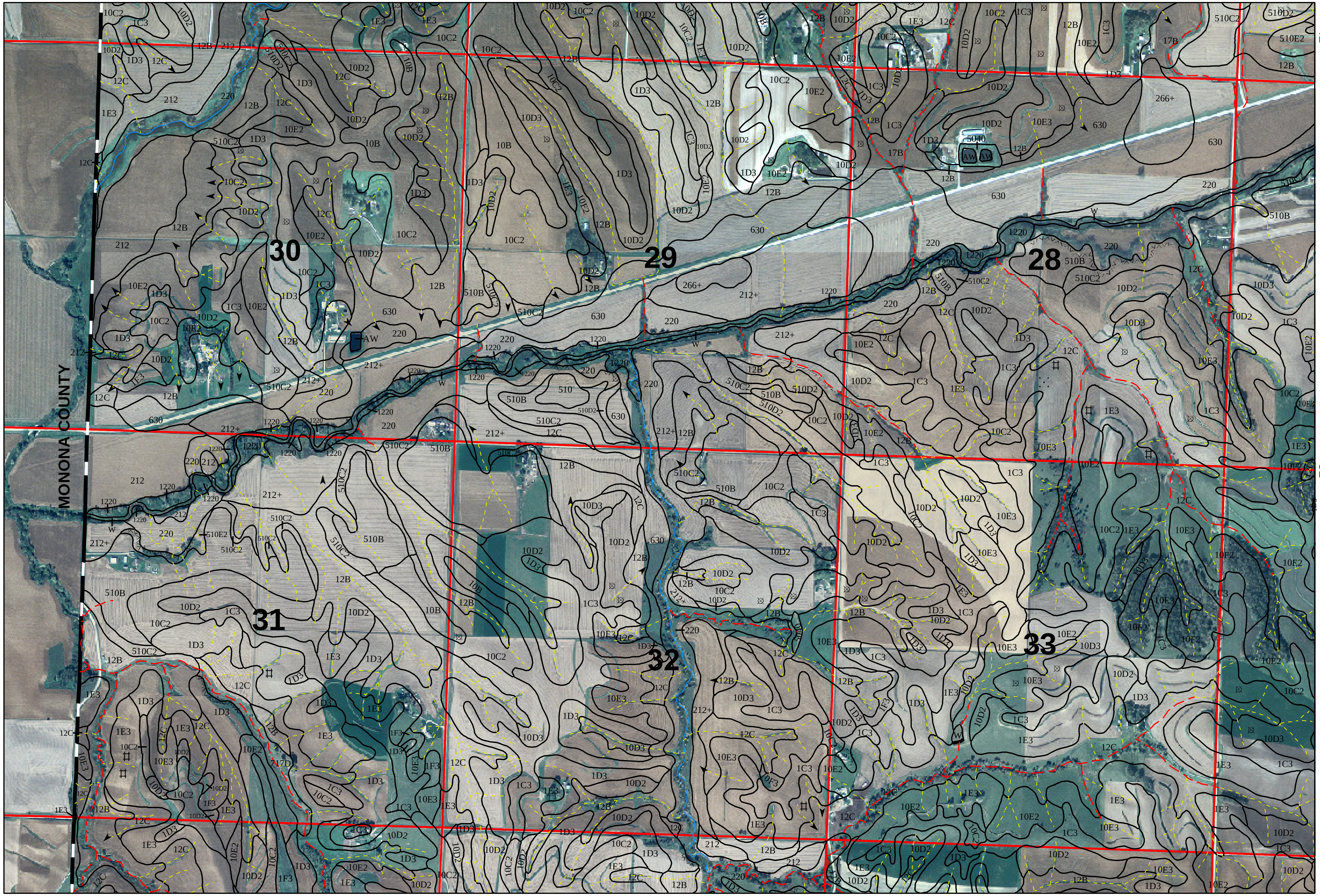
0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

(51) (51)

Township 84N Range 41W



0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

52

Township 84N Range 41W

52

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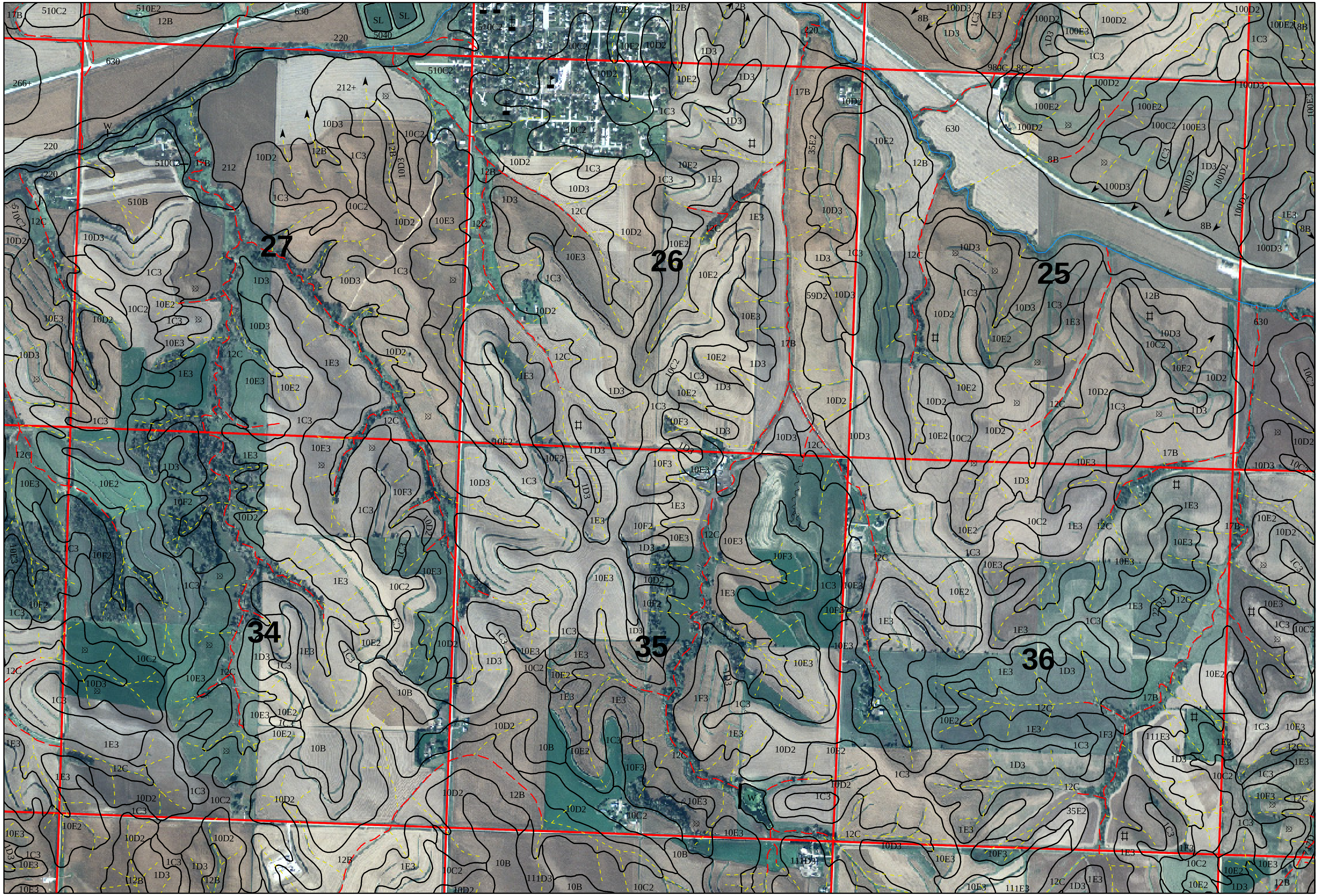

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 40W

53

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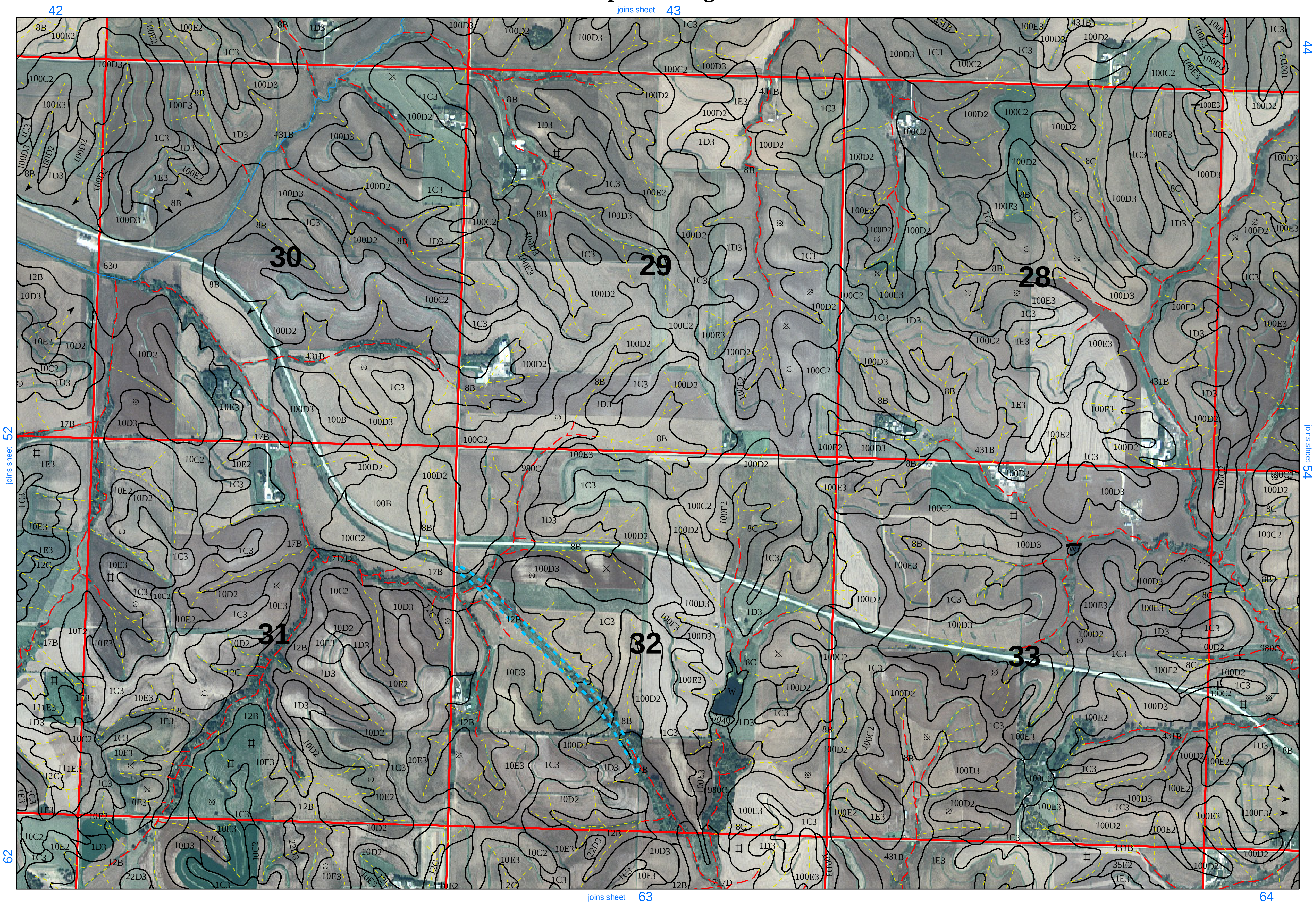

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

54

Township 84N Range 40W

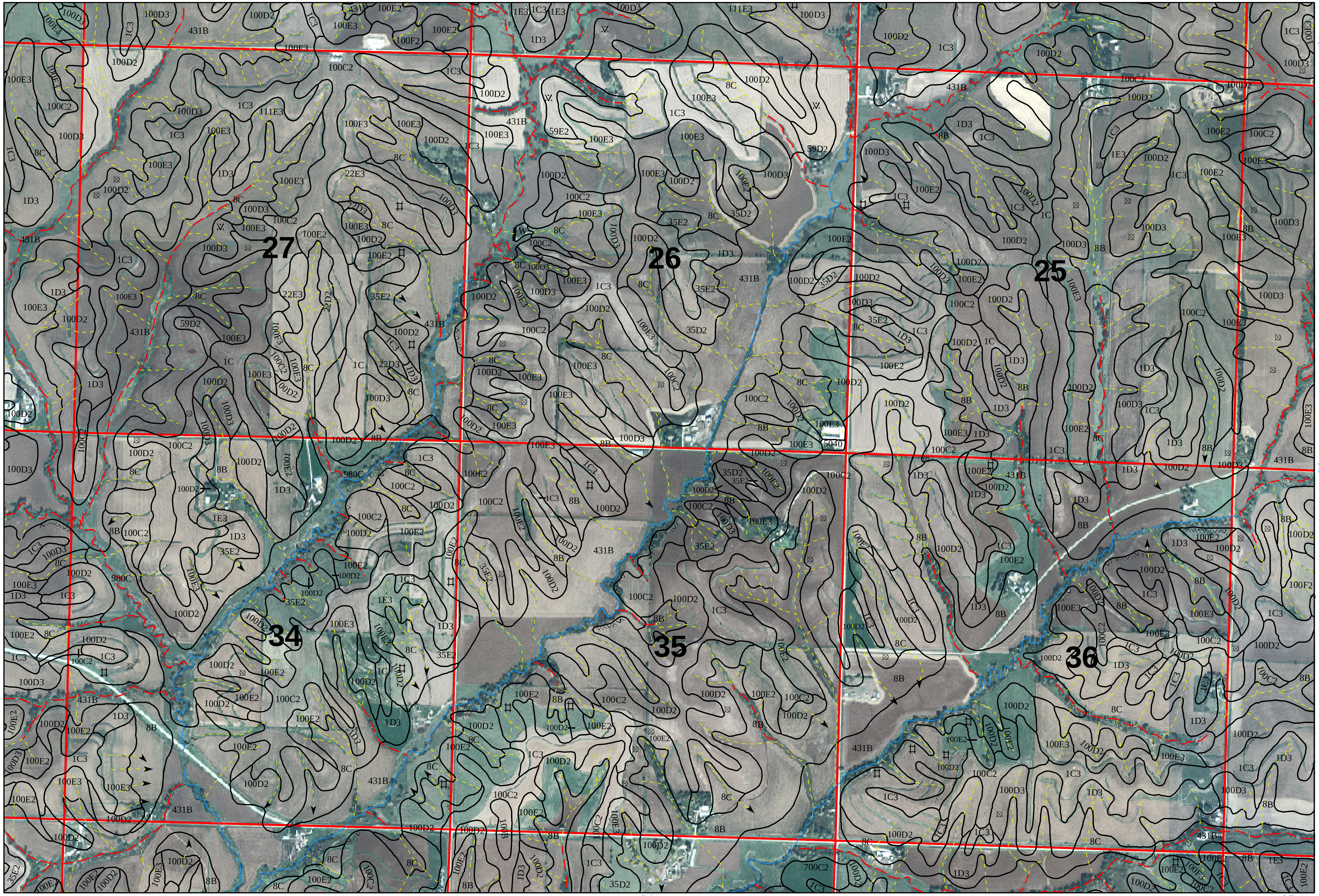
54

43 joins sheet 44

45

joins sheet 53

joins sheet 55



63

joins sheet 64

65

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Township 84N Range 39W

55

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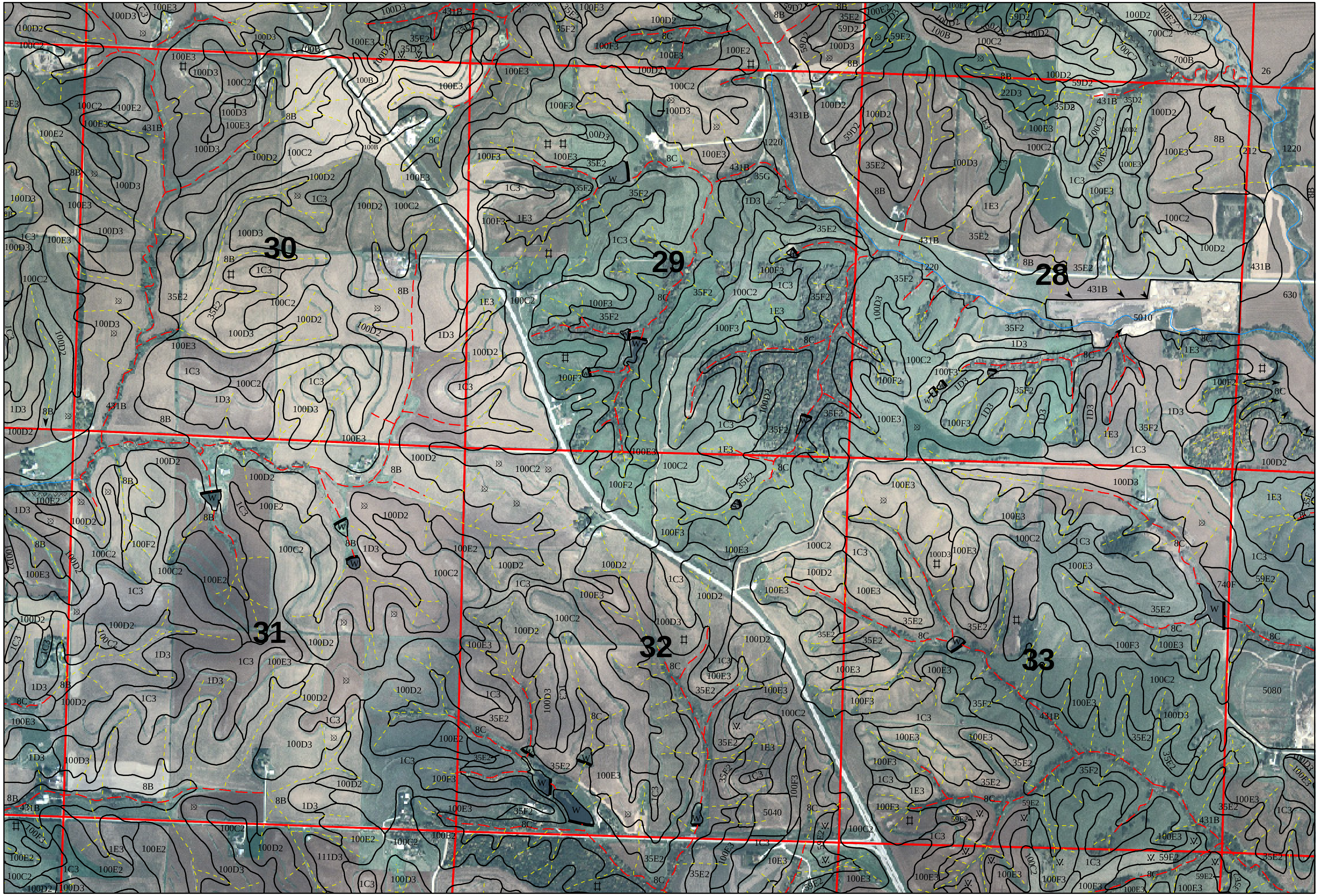

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

56

Township 84N Range 39W

56

45

joins sheet 46

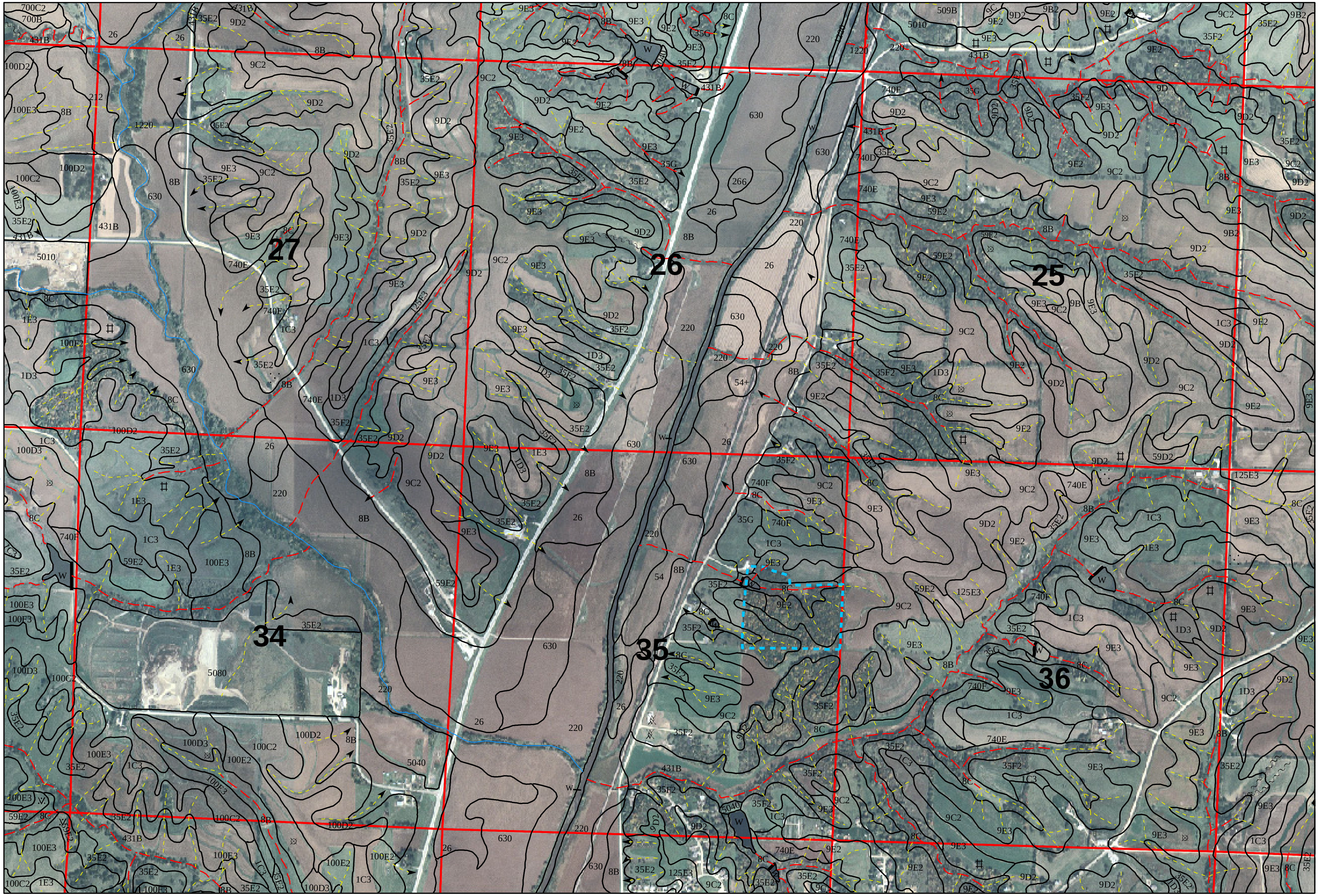
47

joins sheet 57

55

joins sheet

65



joins sheet 66

67

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Township 84N Range 38W

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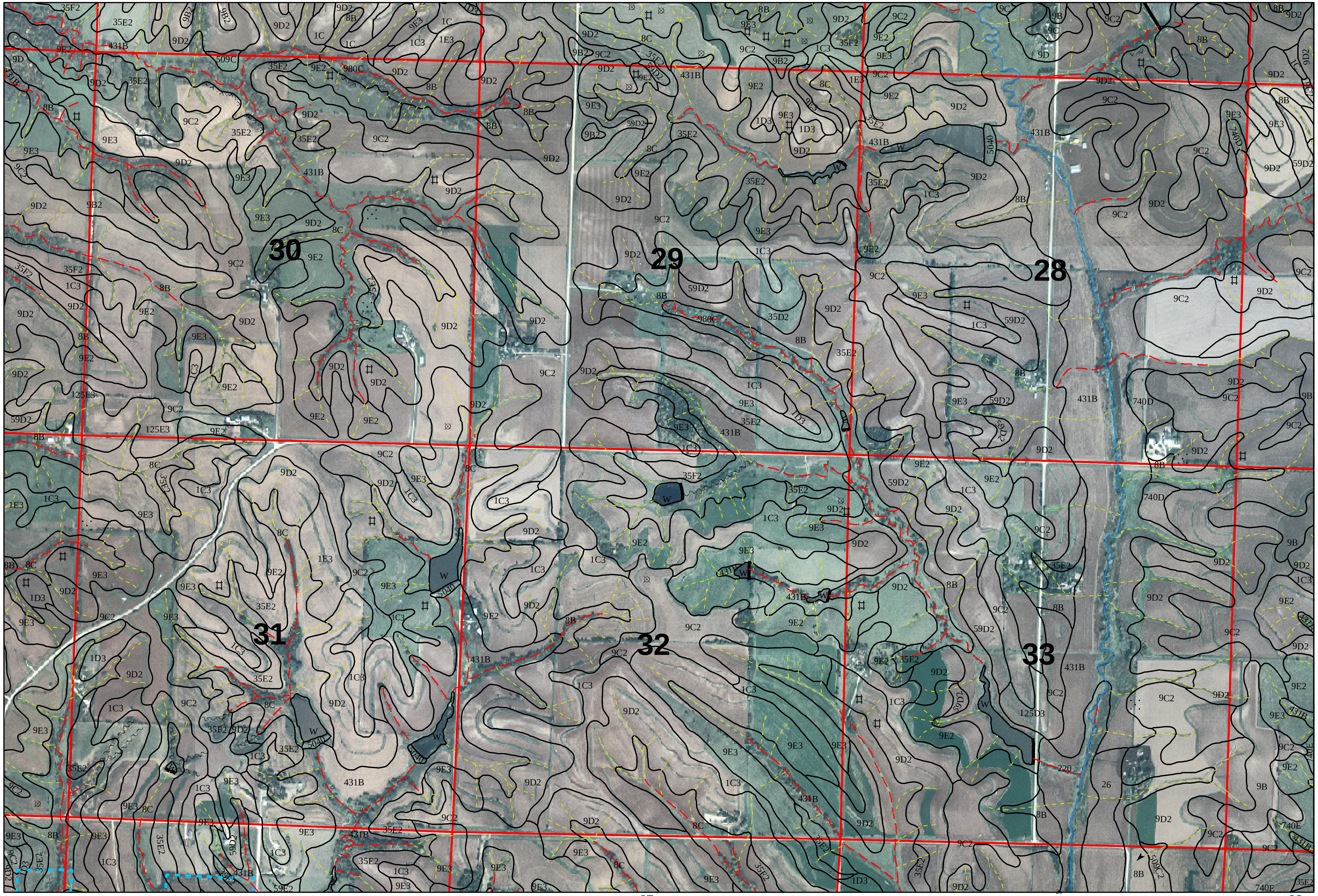

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 84N Range 38W

47 joins sheet 48

49

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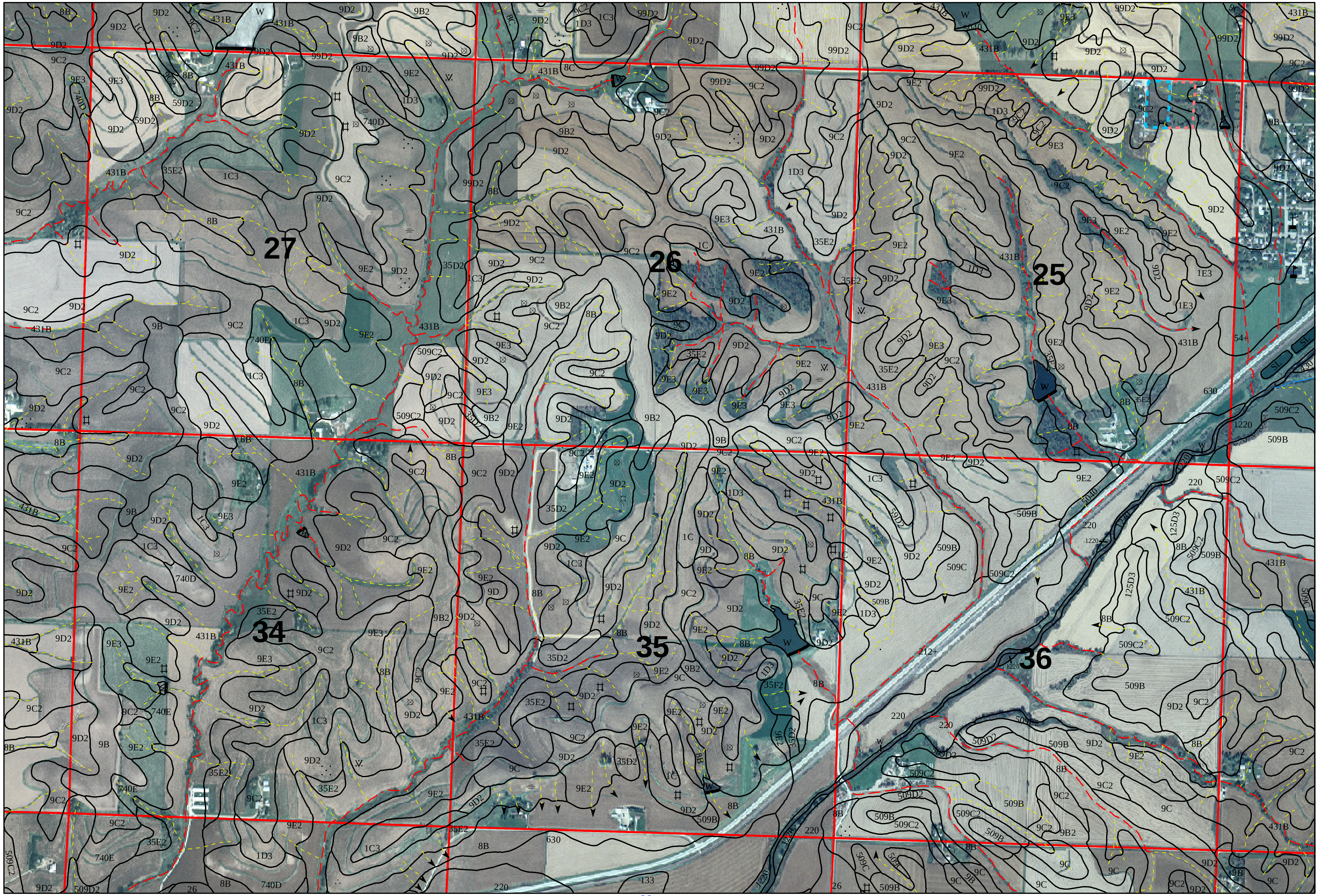
57 joins sheet



joins sheet 59

67

joins sheet 68

69

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

9D2

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 84N Range 37W

Soil Survey of Crawford County, Iowa

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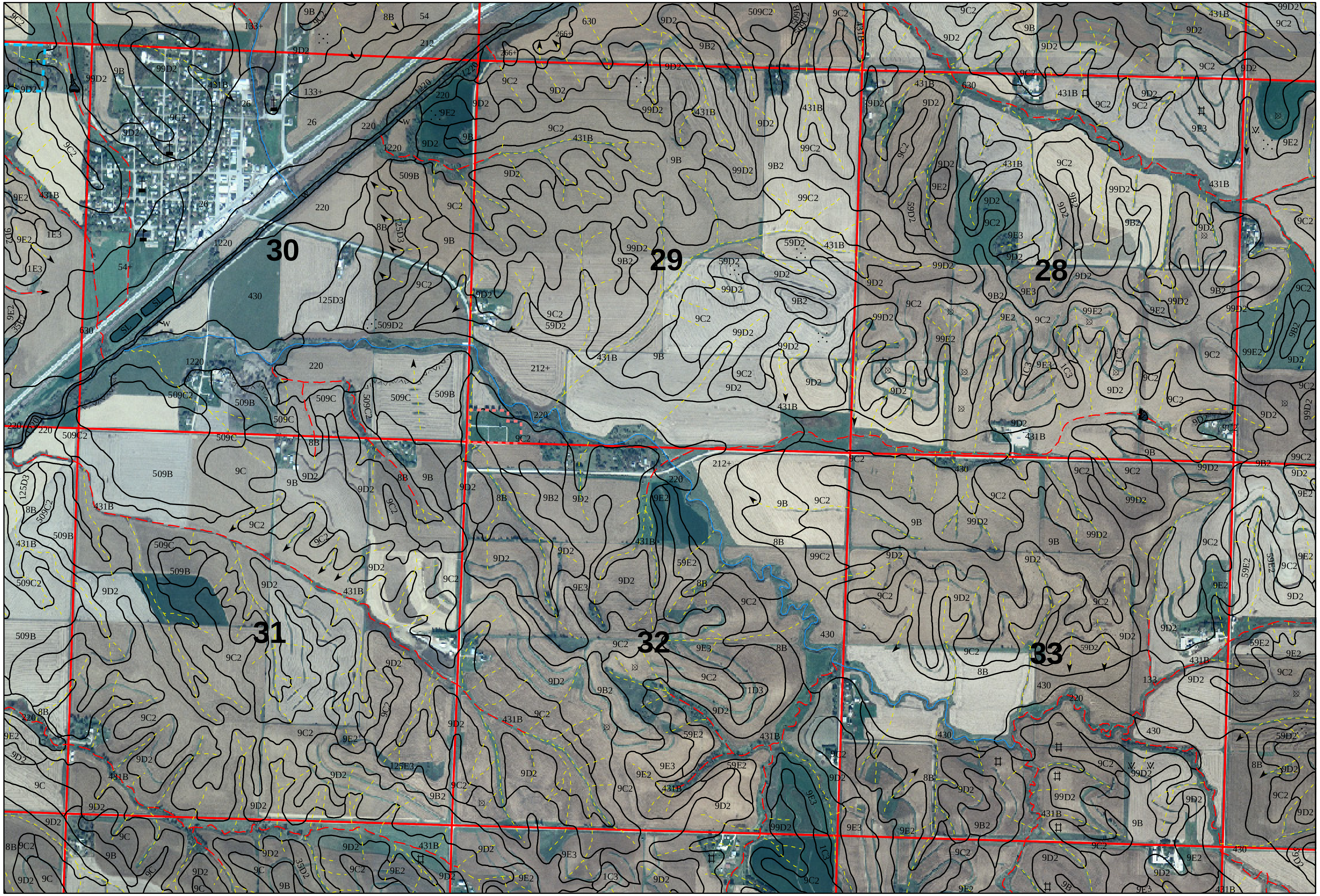
48
joins sheet 49
50
joins sheet 60
70
joins sheet 69
68
joins sheet 58



N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

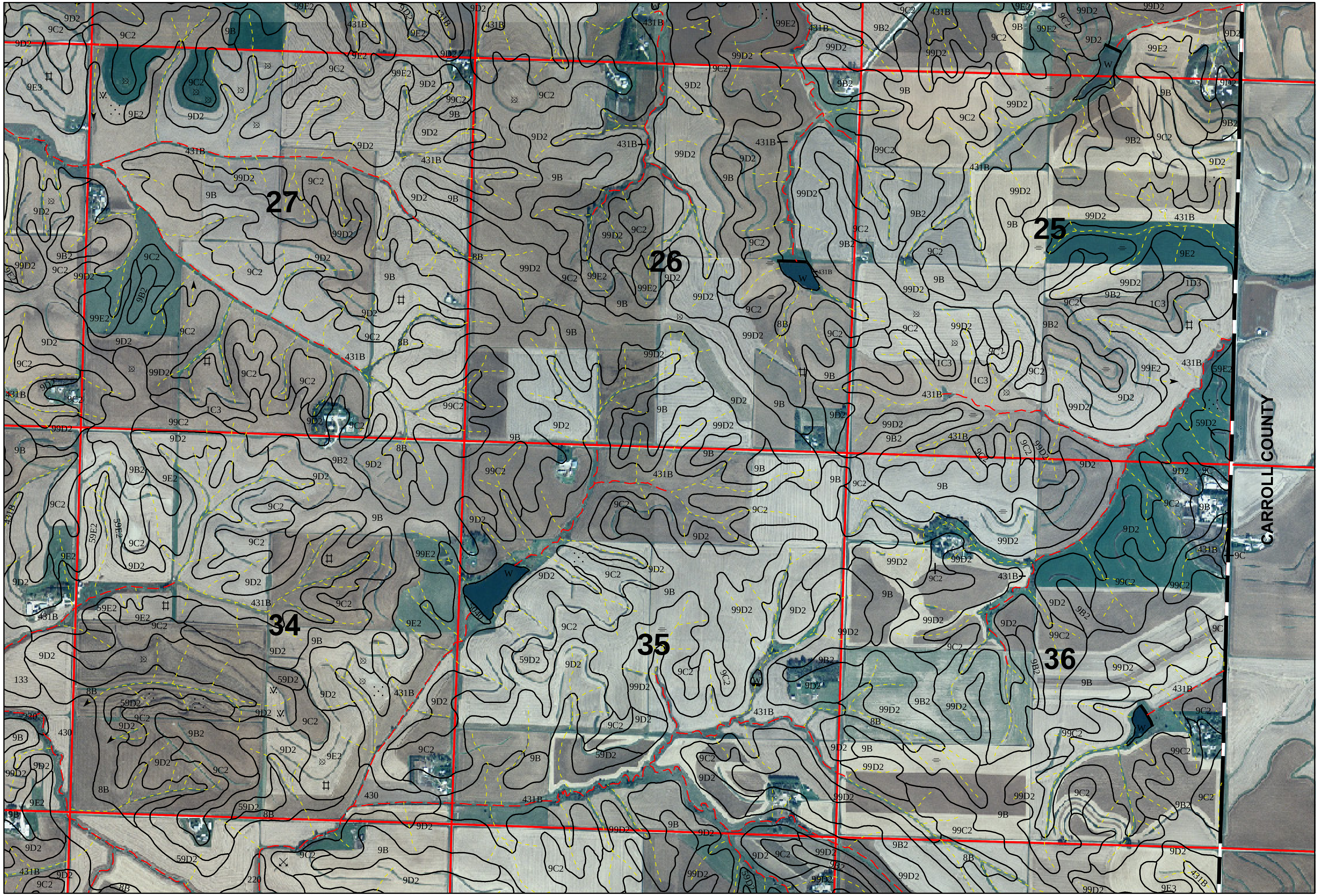
60

Township 84N Range 37W

60

49

joins sheet 50



joins sheet 59

69

joins sheet 70

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
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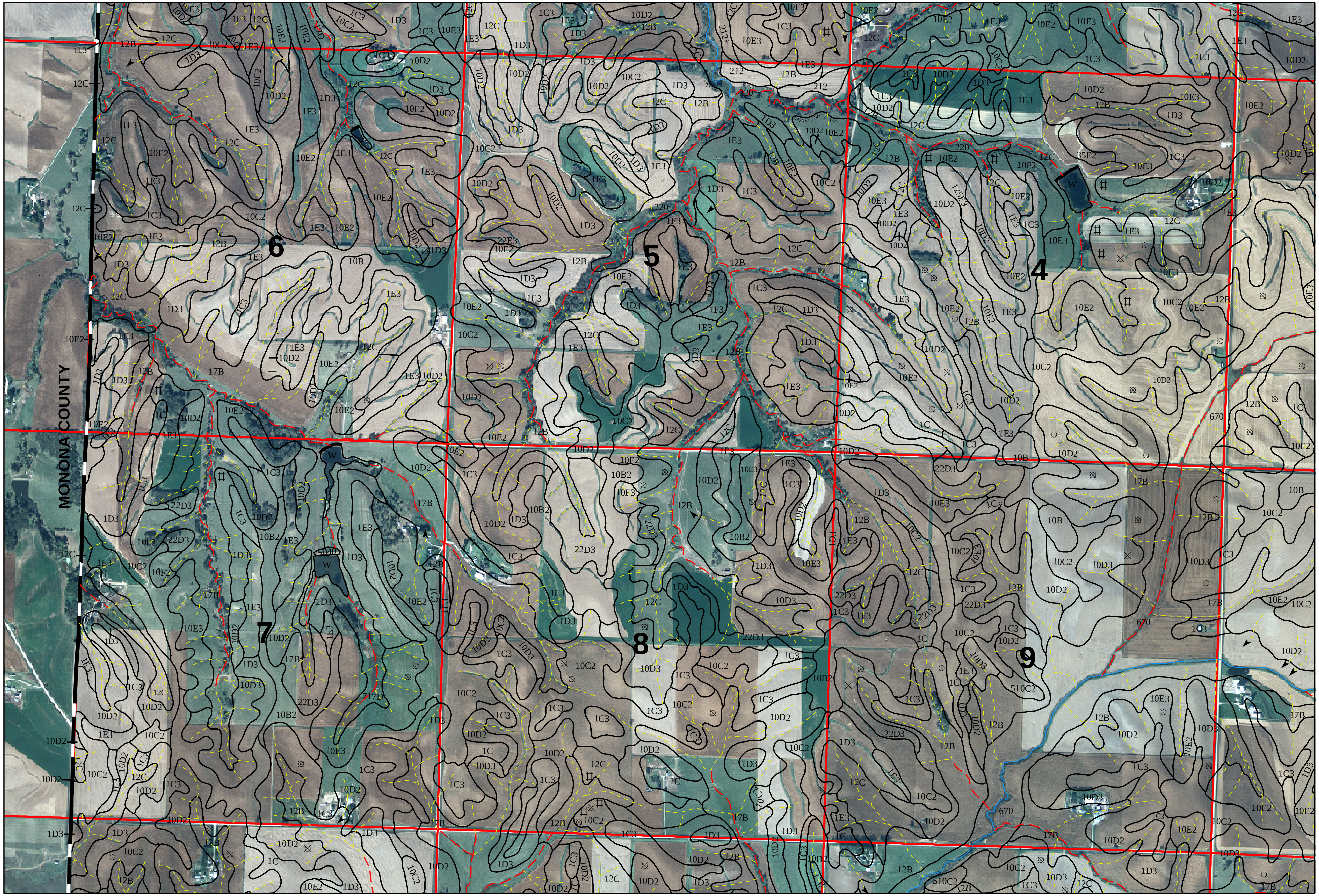
Township 83N Range 41W

joins sheet 51



joins sheet 52
joins sheet 62
joins sheet 71
72

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

62

Township 83N Range 41W

62

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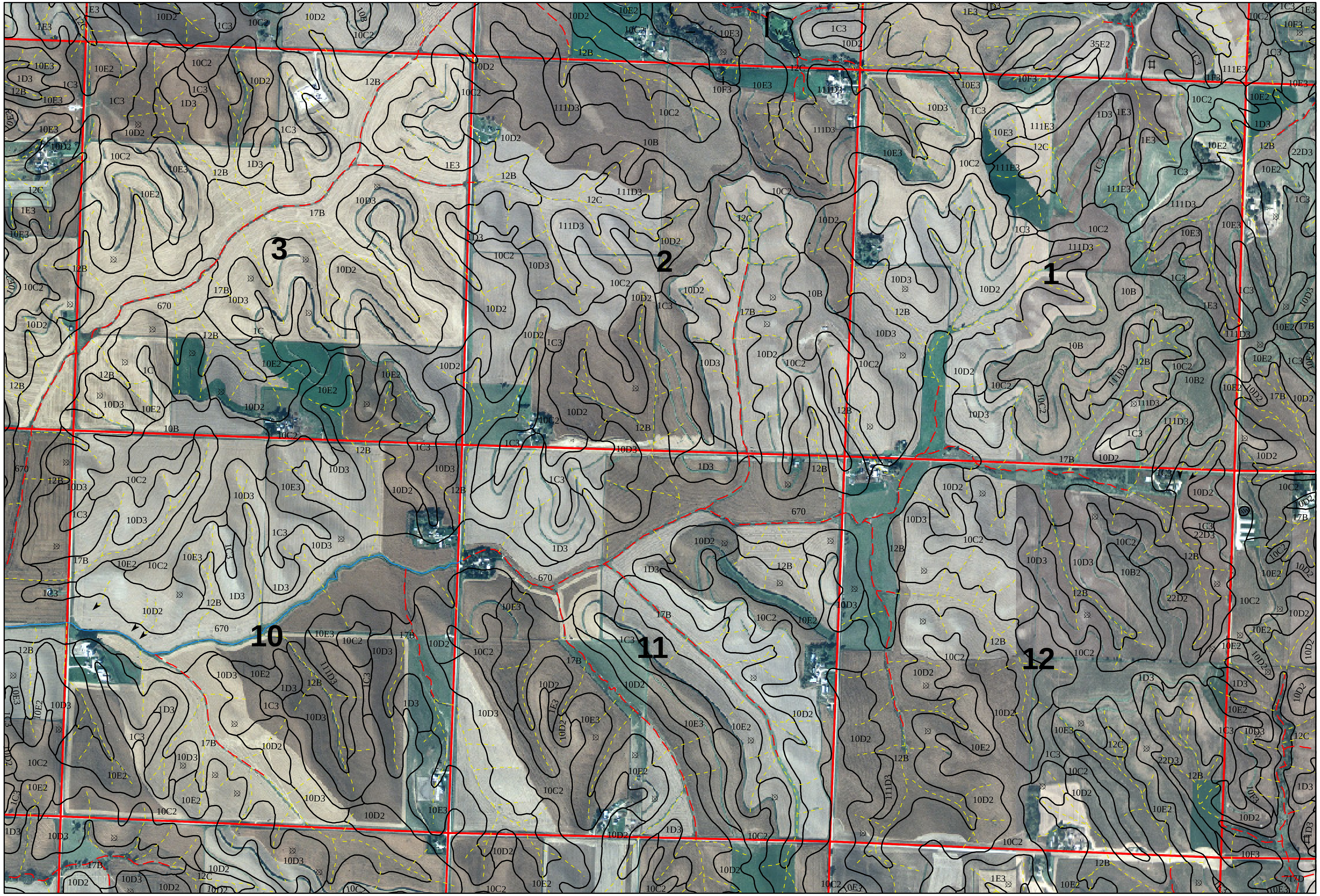
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

51 joins sheet 52 53

61 joins sheet joins sheet 63



71 joins sheet 72 73

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0 1/4 1/2 3/4 1 Miles

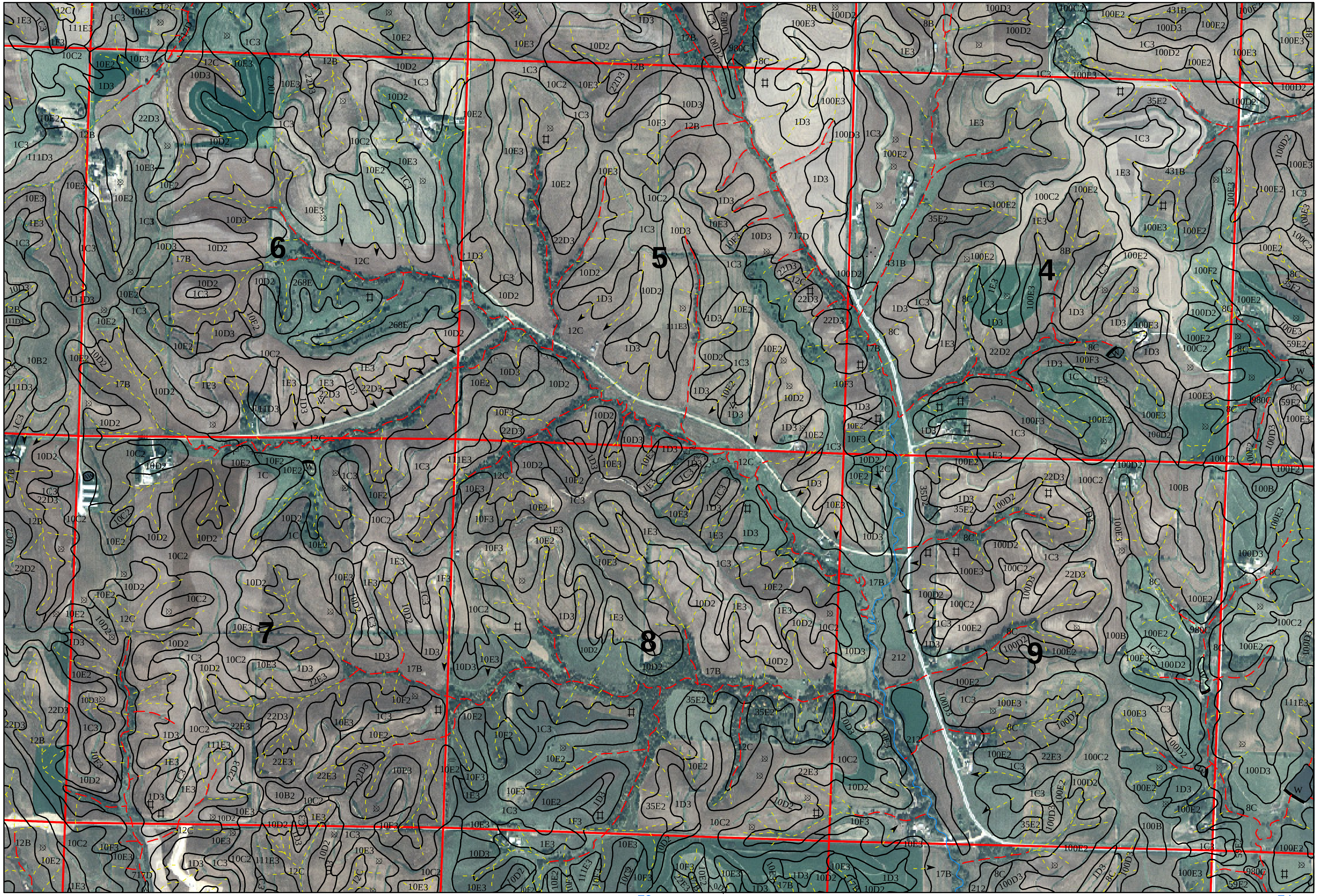
0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 40W

63



0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

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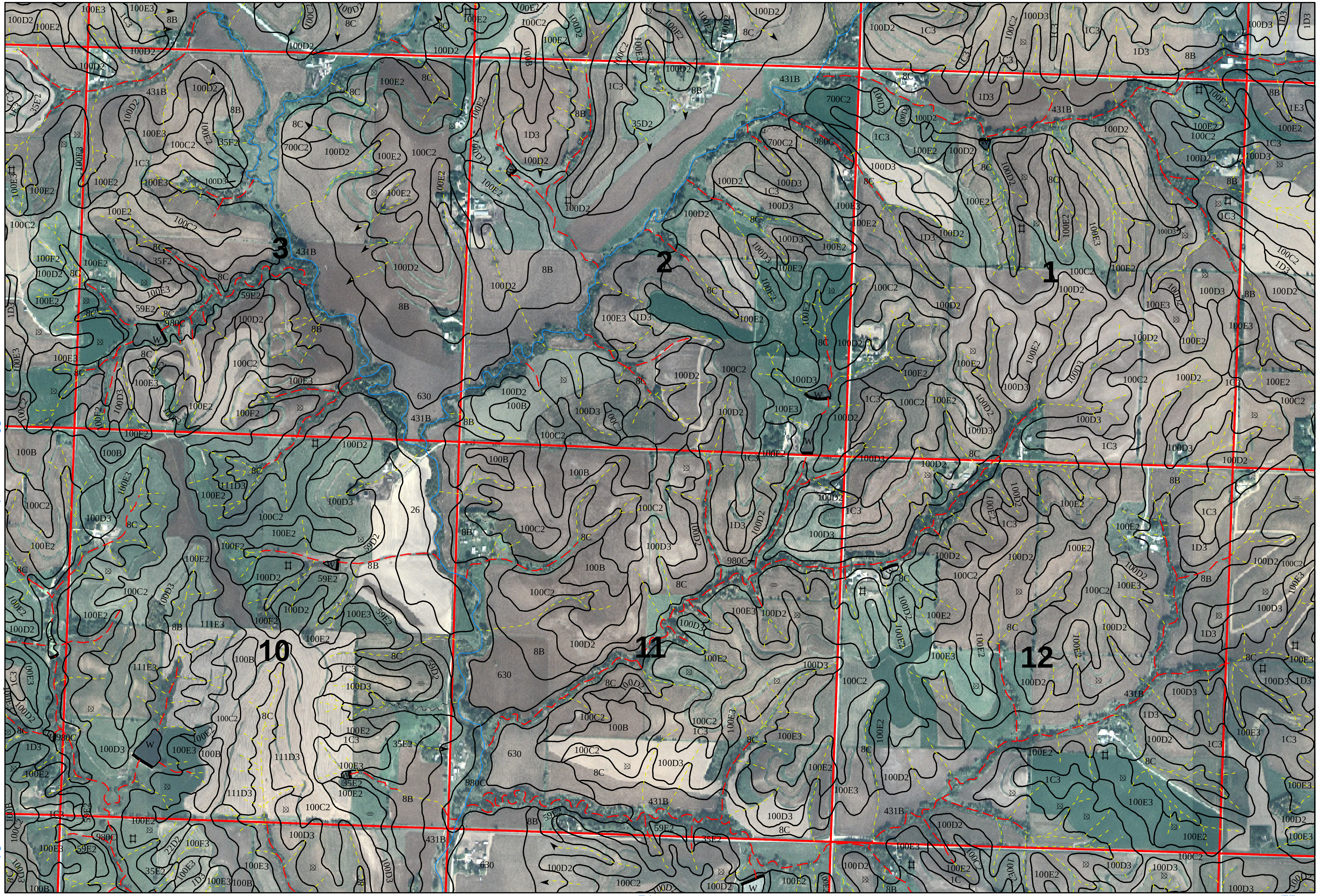
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 40W

53 joins sheet 54 55 joins sheet 65 63 joins sheet 73 joins sheet 74 75



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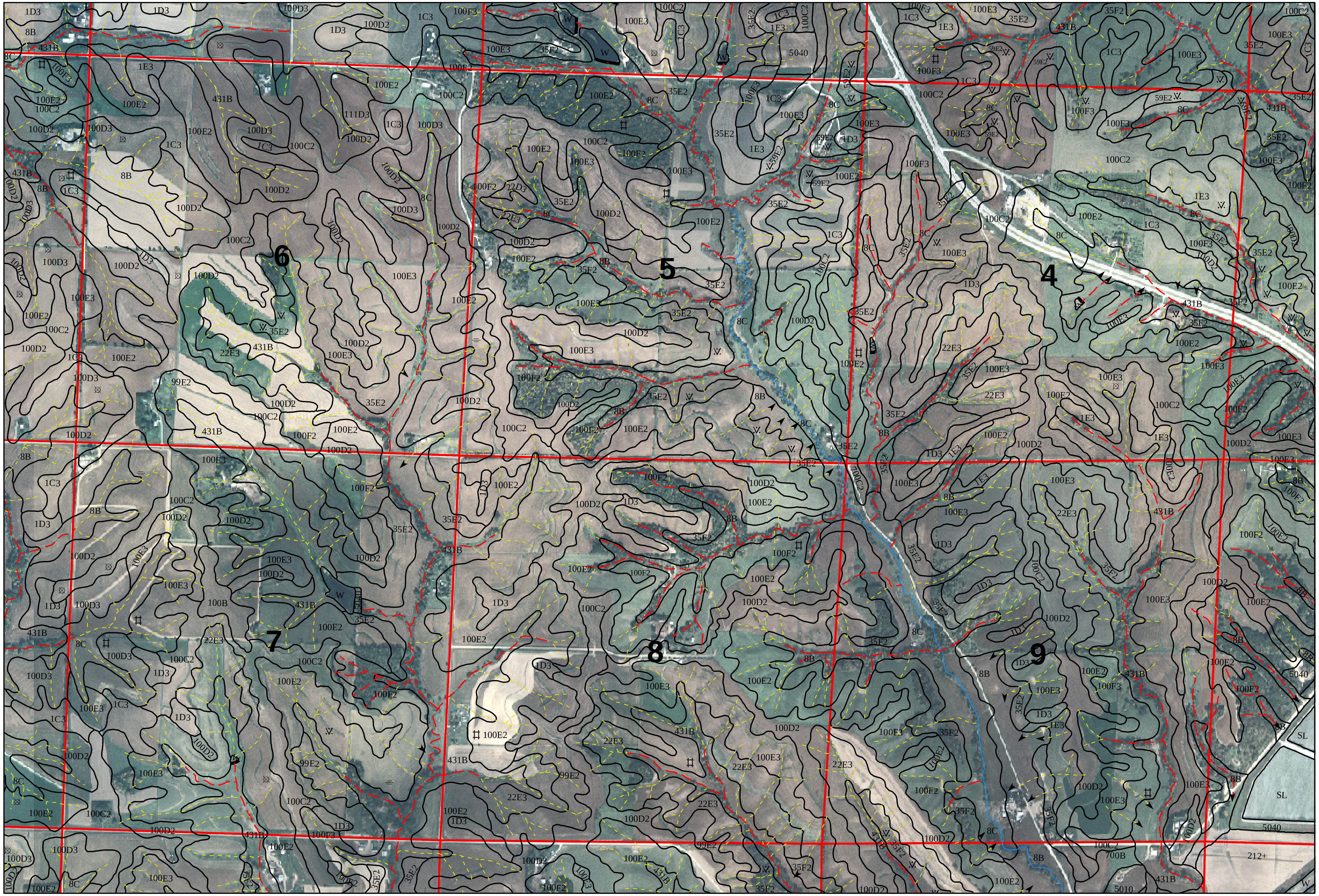
0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 39W



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 39W

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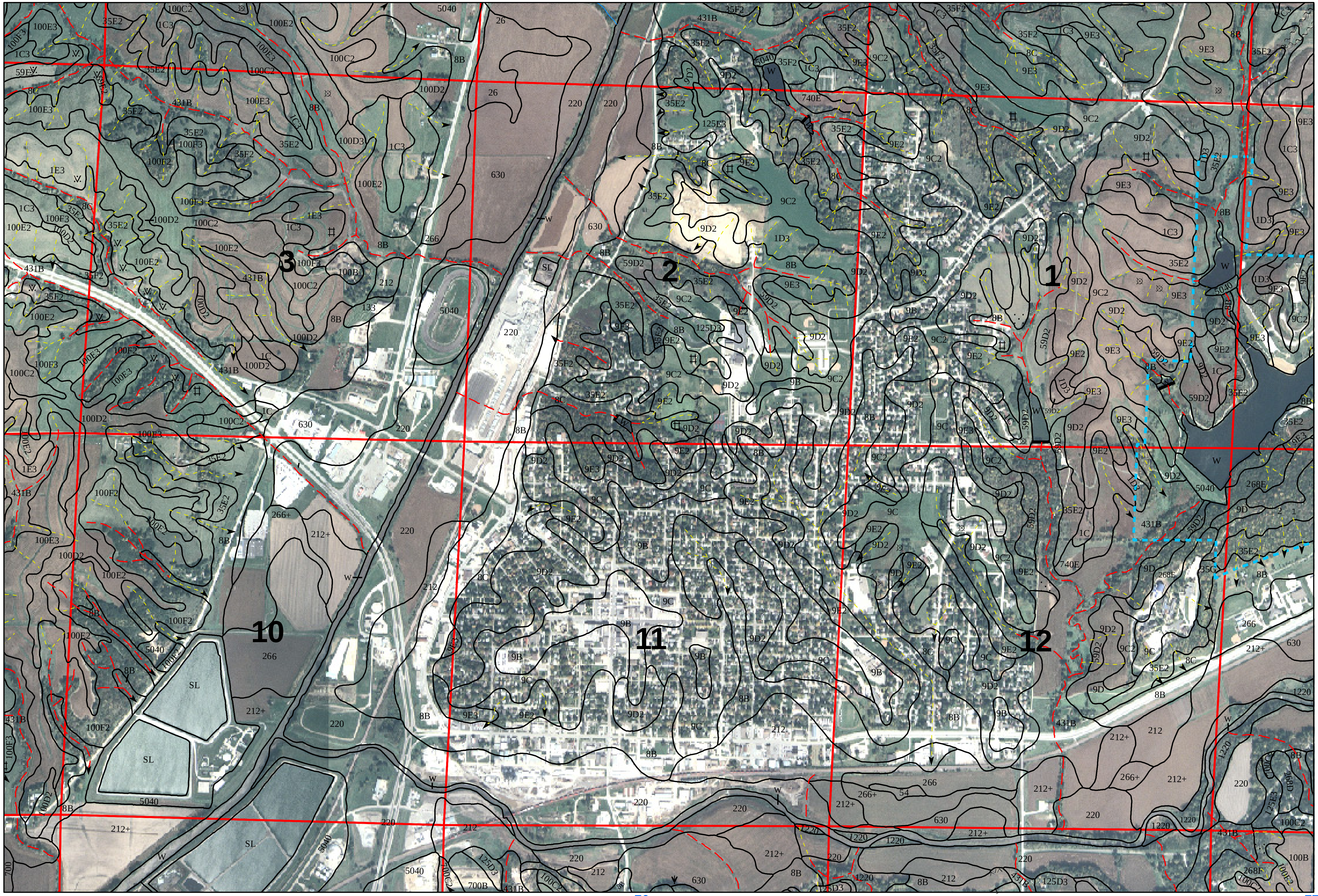

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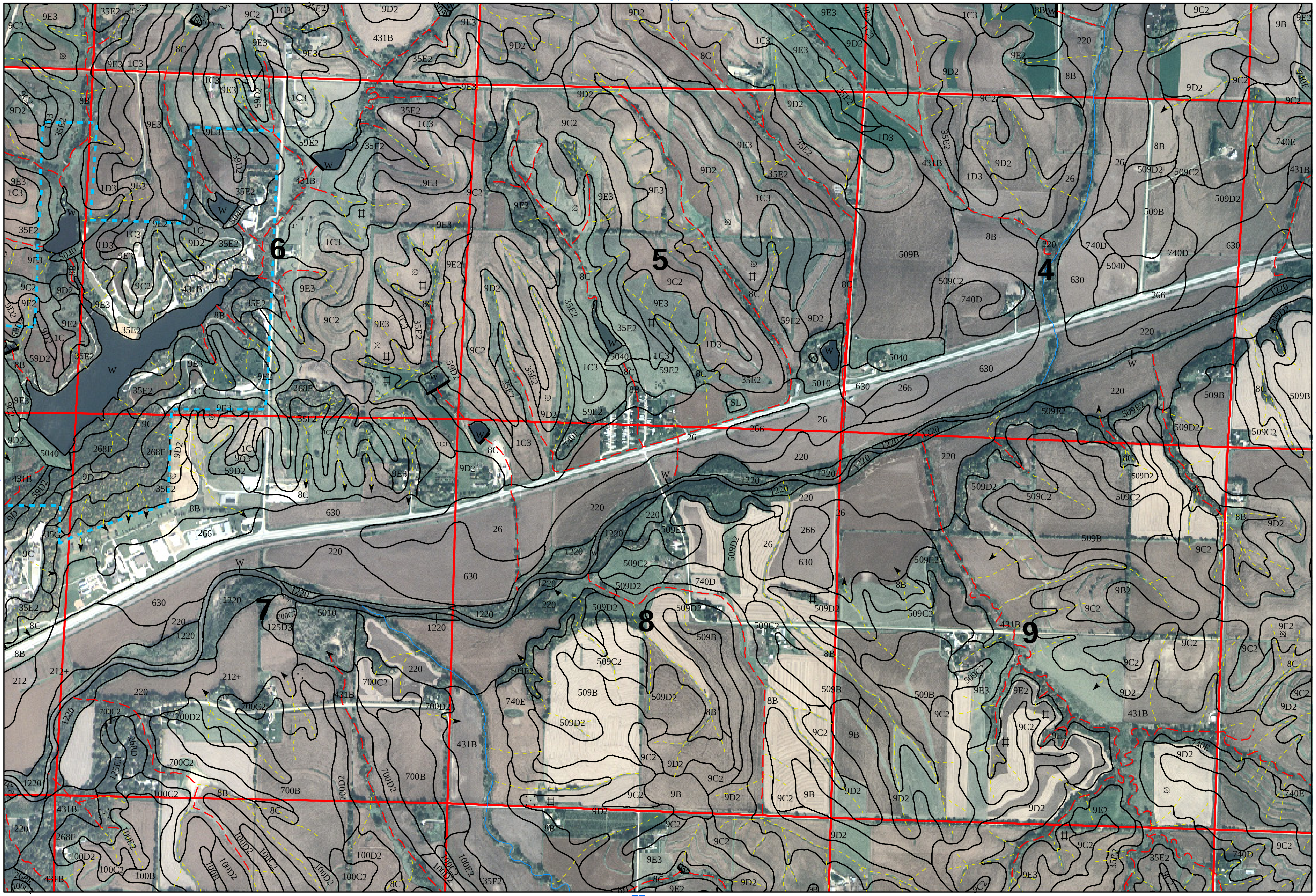
0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 38W

joins sheet 57



56
58
joins sheet 66
joins sheet 68
76
78
joins sheet 77

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

0 1/4 1/2 3/4 1 Miles
0 1,000 2,000 3,000 4,000 5,000 Feet

N

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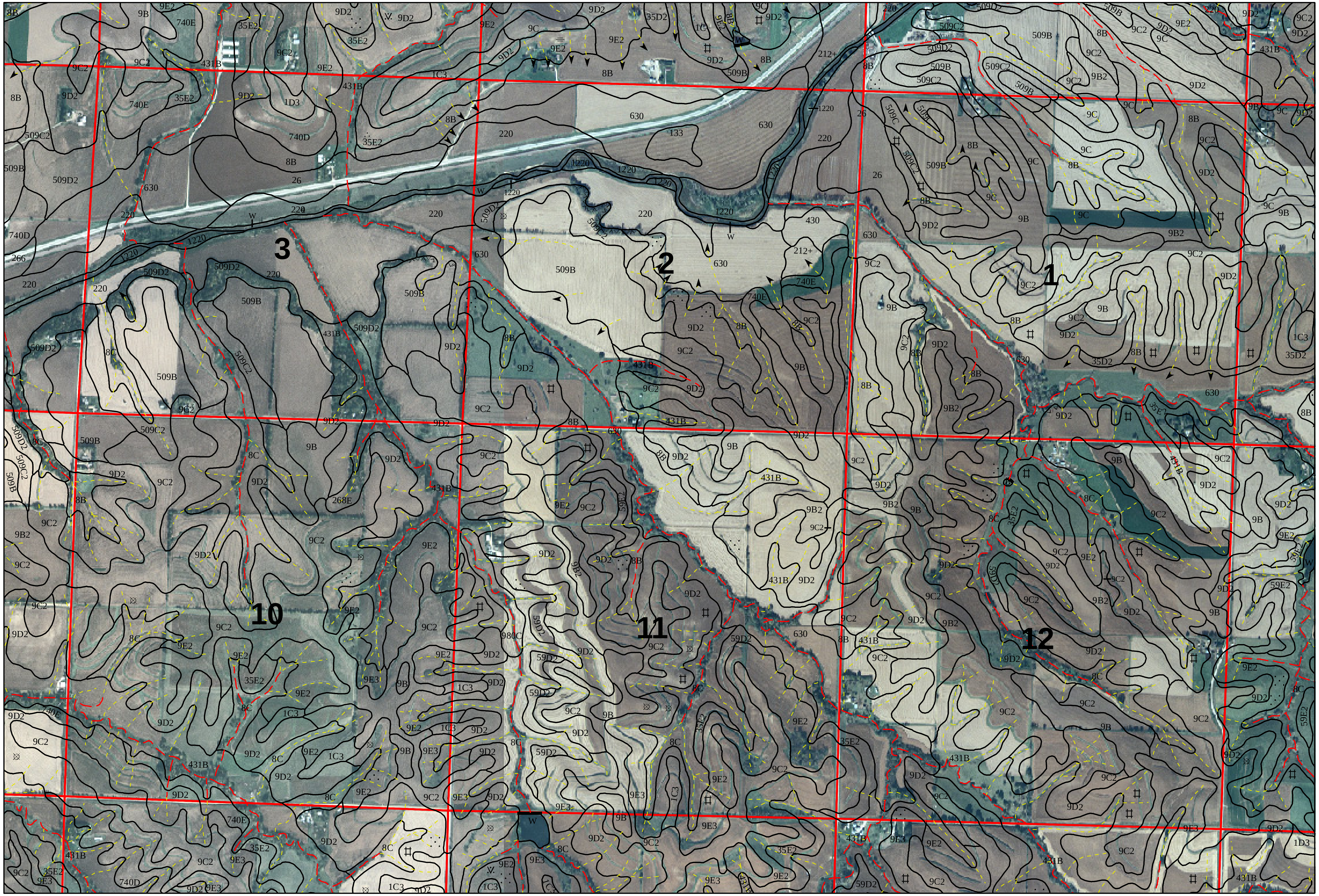
United States Department of Agriculture
NRCS Natural Resources Conservation Service

67

Township 83N Range 38W

68

57 joins sheet 58



59

67 joins sheet 69

77 joins sheet 78 79

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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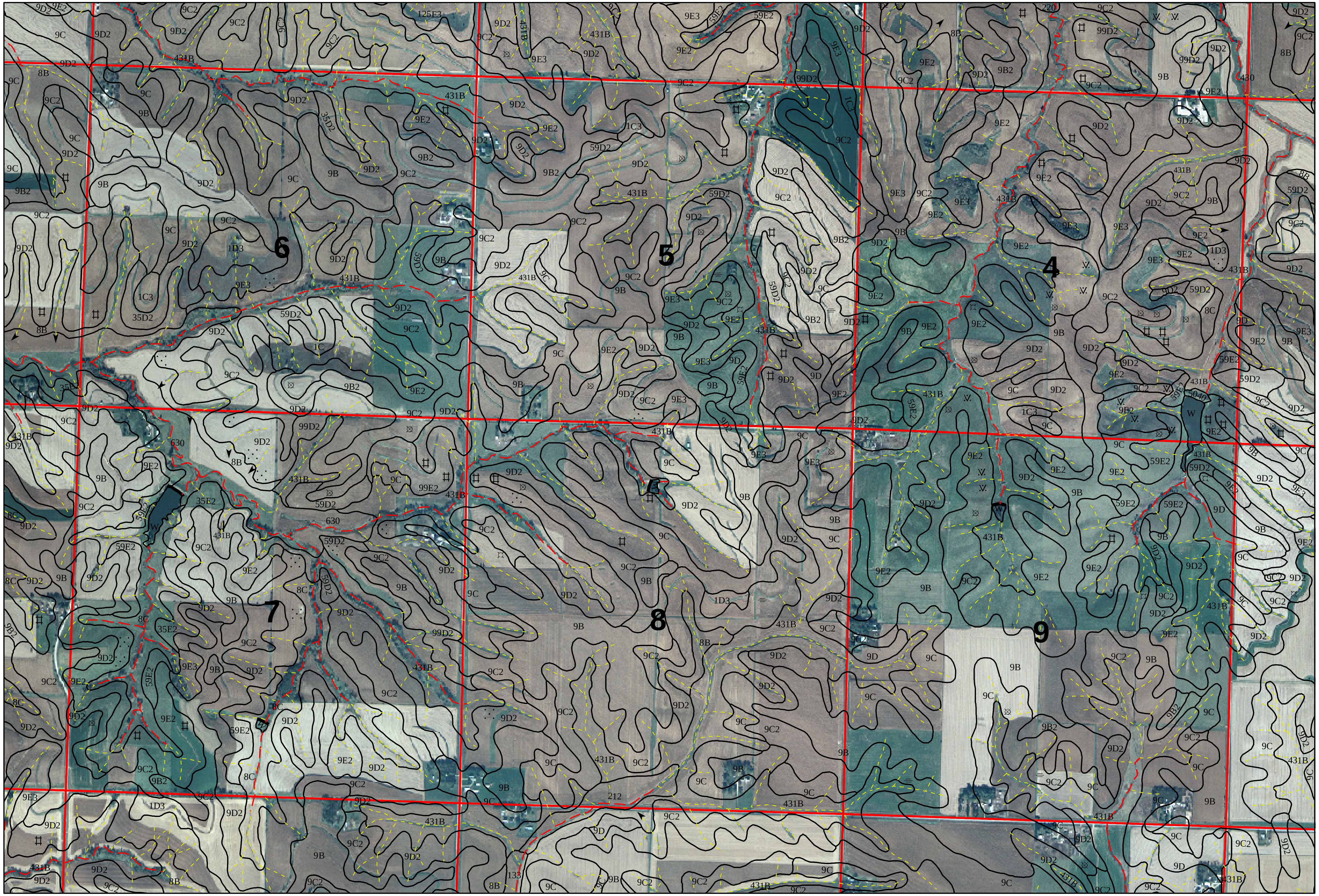
United States Department of Agriculture
NRCS Natural Resources Conservation Service

69

Township 83N Range 37W

69

joins sheet 59



joins sheet 79

joins sheet

joins sheet

58
60
68
70
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80

N

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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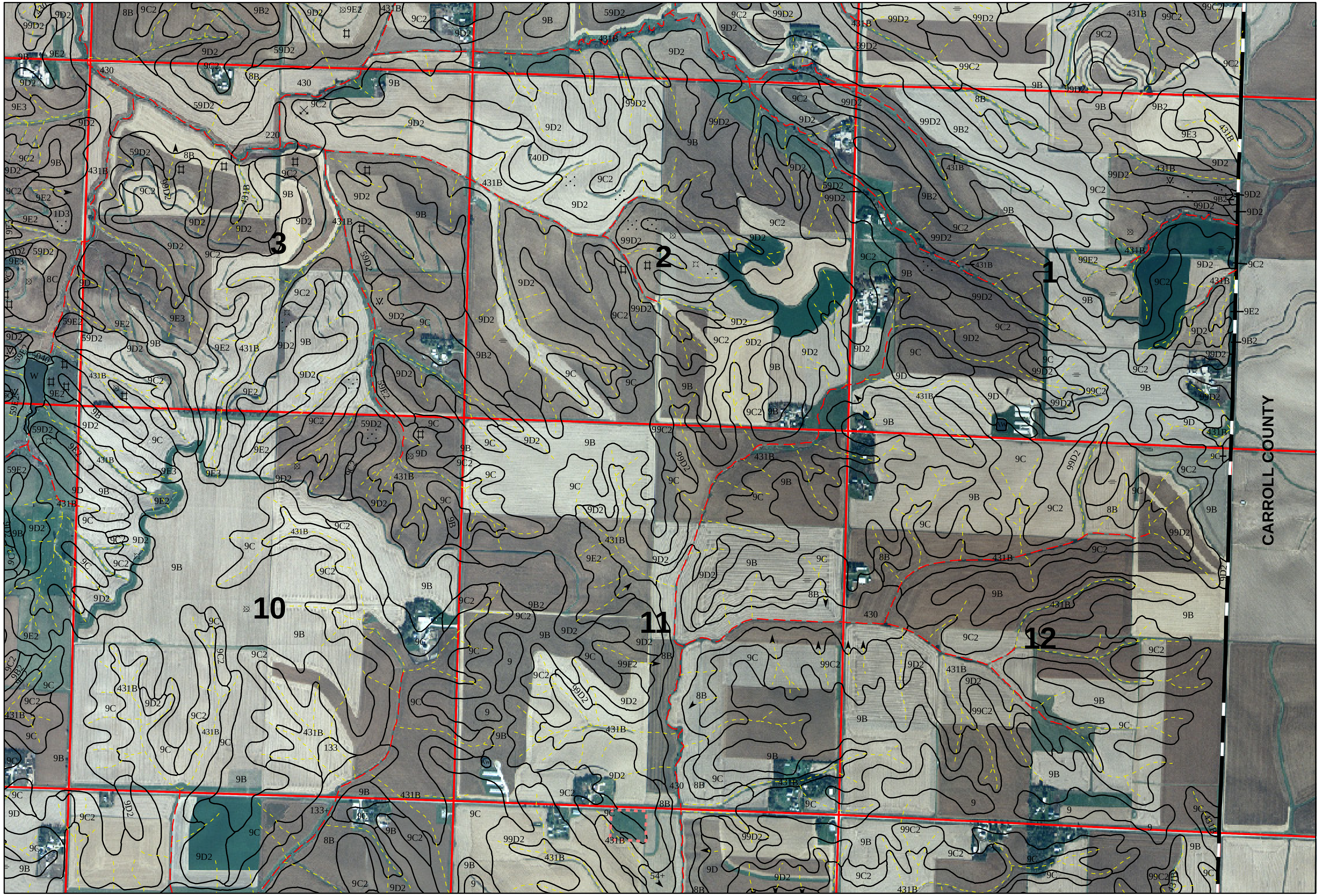
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 37W

59 joins sheet 60

69 joins sheet

79



joins sheet 80

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0 1/4 1/2 3/4 1 Miles

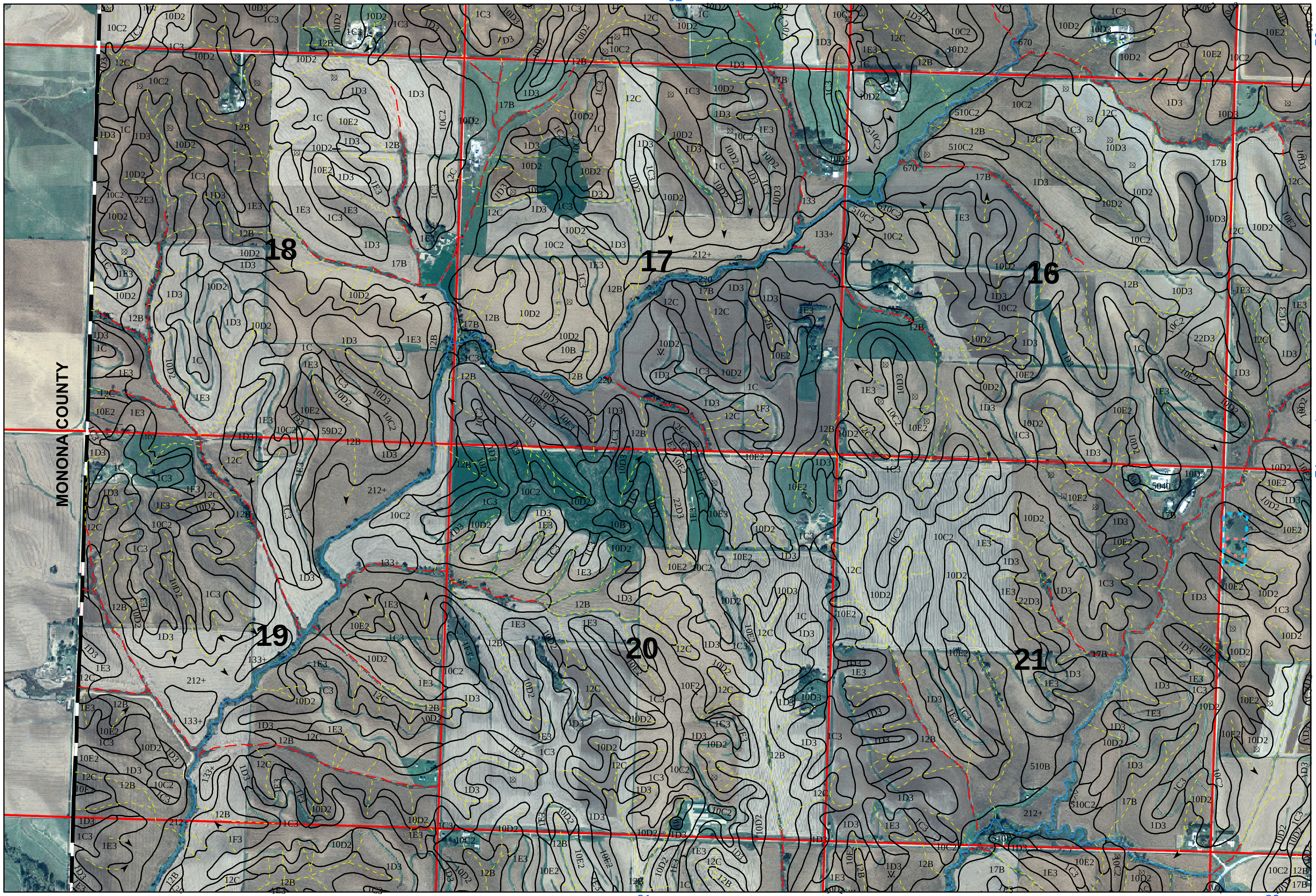
0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 41W

joins sheet 61



joins sheet 62

joins sheet 72

joins sheet 81

82

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 83N Range 41W

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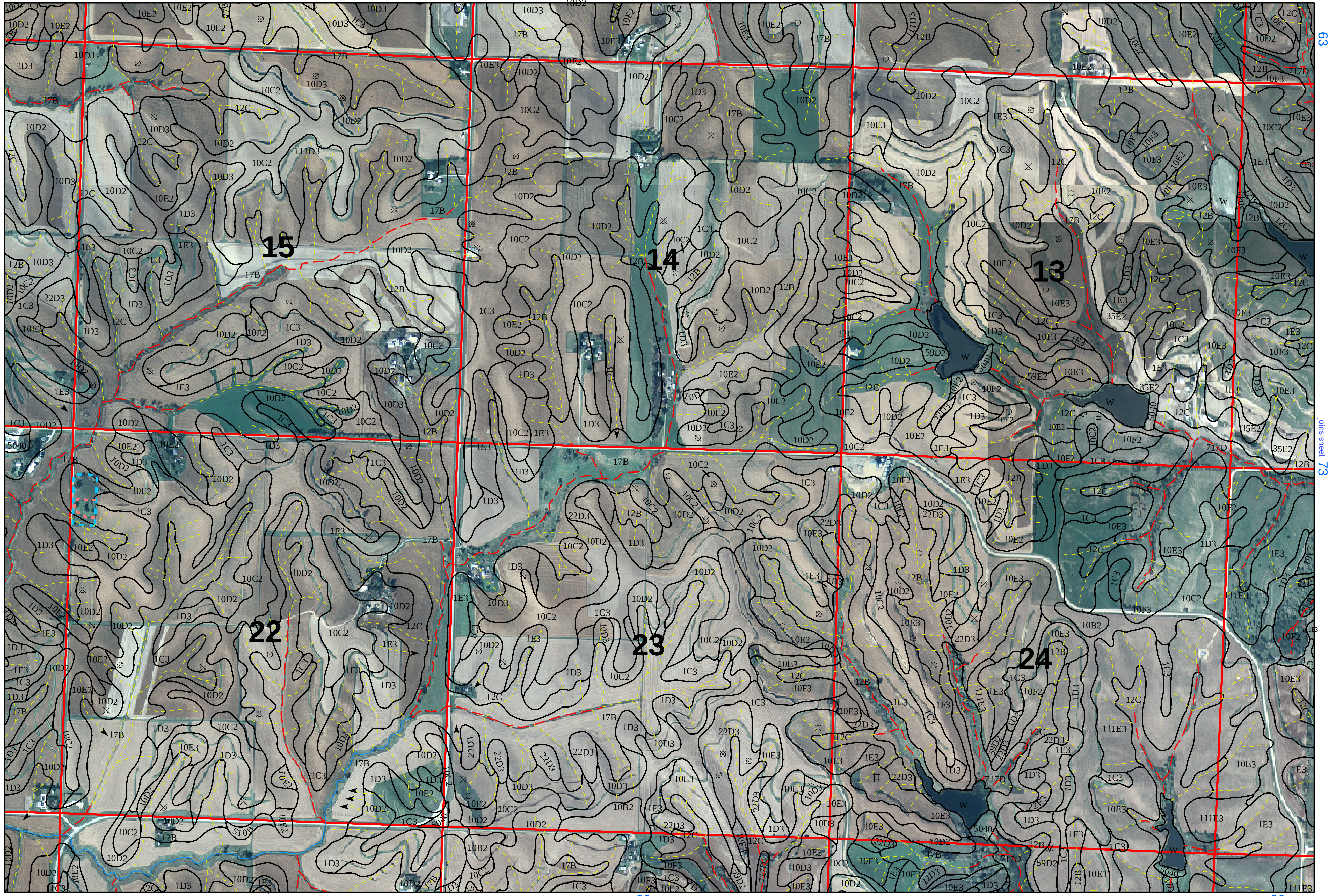
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

61 joins sheet 62 63
71 joins sheet joins sheet 73
81 joins sheet 82 83



0 1/4 1/2 3/4 1 Miles
0 1,000 2,000 3,000 4,000 5,000 Feet

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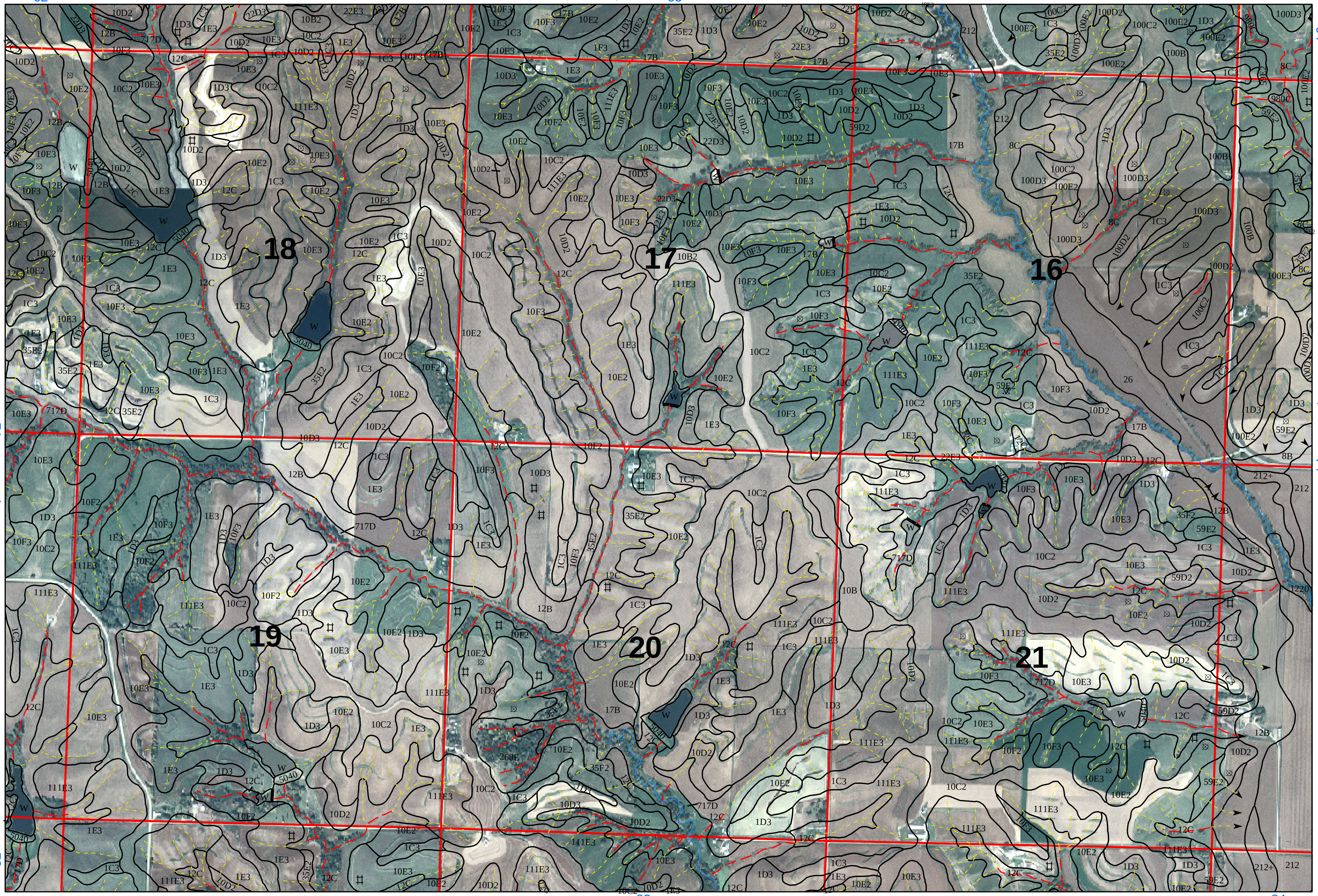
United States Department of Agriculture
NRCS Natural Resources Conservation Service

73

Township 83N Range 40W

73

62 joins sheet 63 64



joins sheet 72

joins sheet 74

82 joins sheet 83 84

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 40W

74

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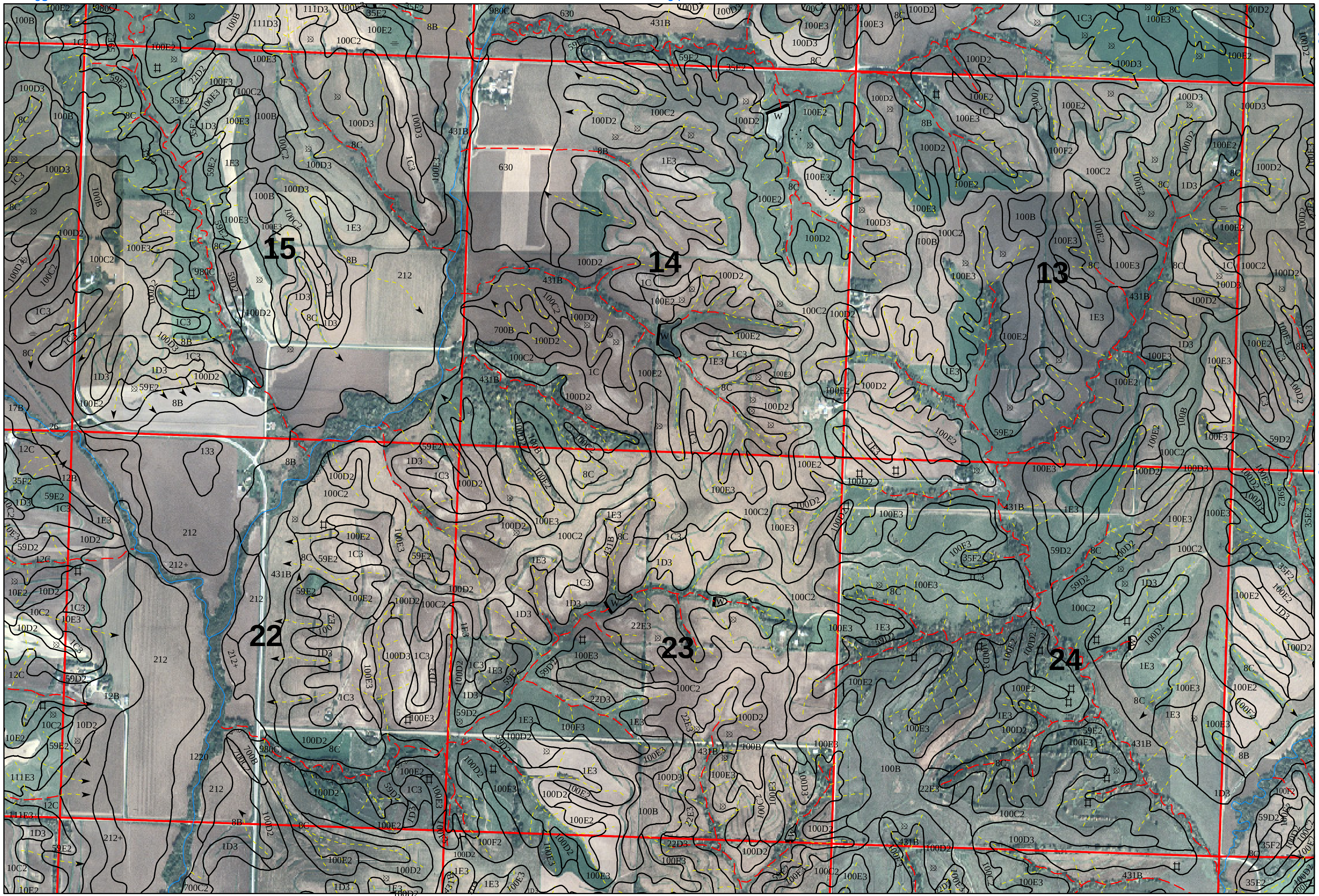

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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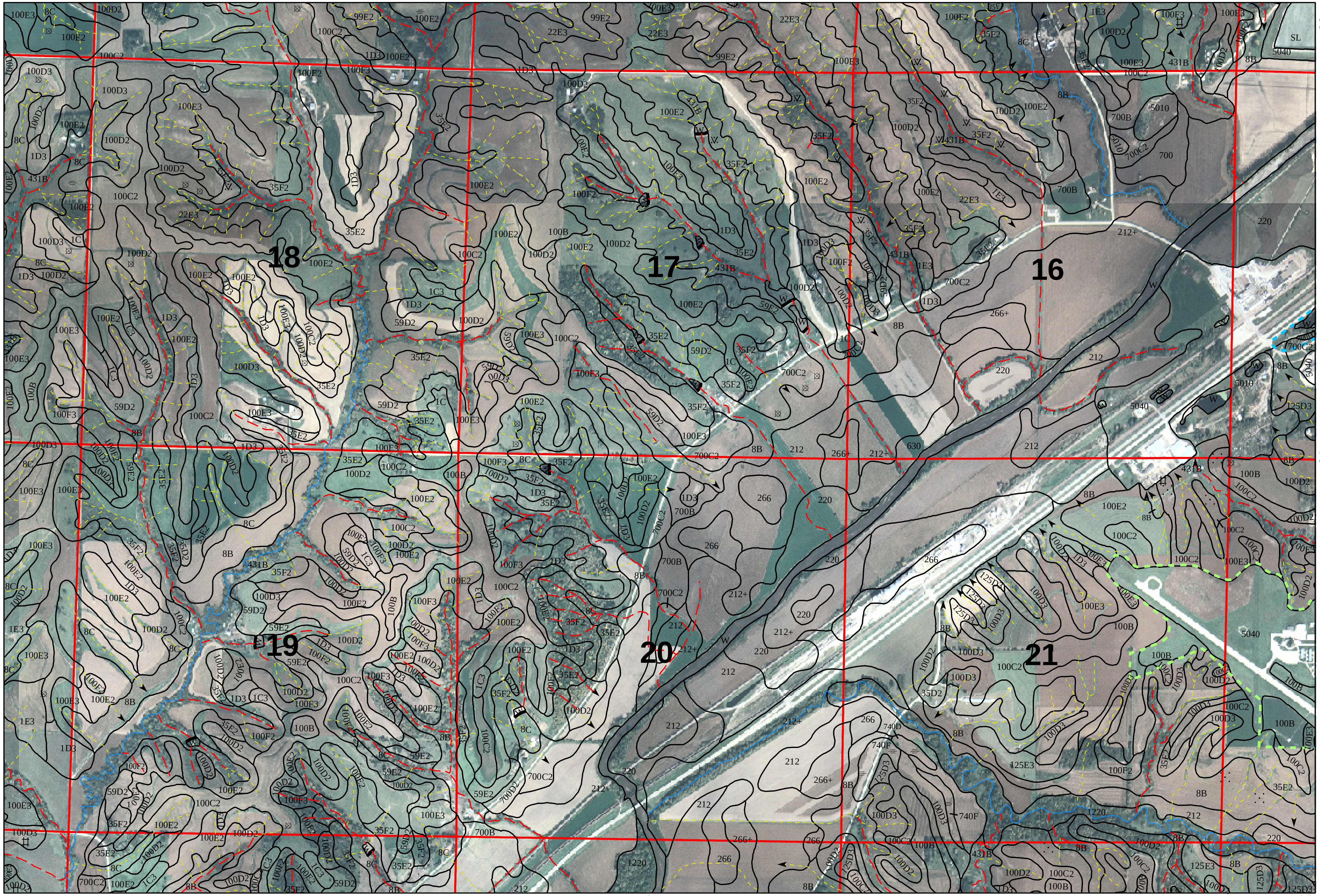
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 39W



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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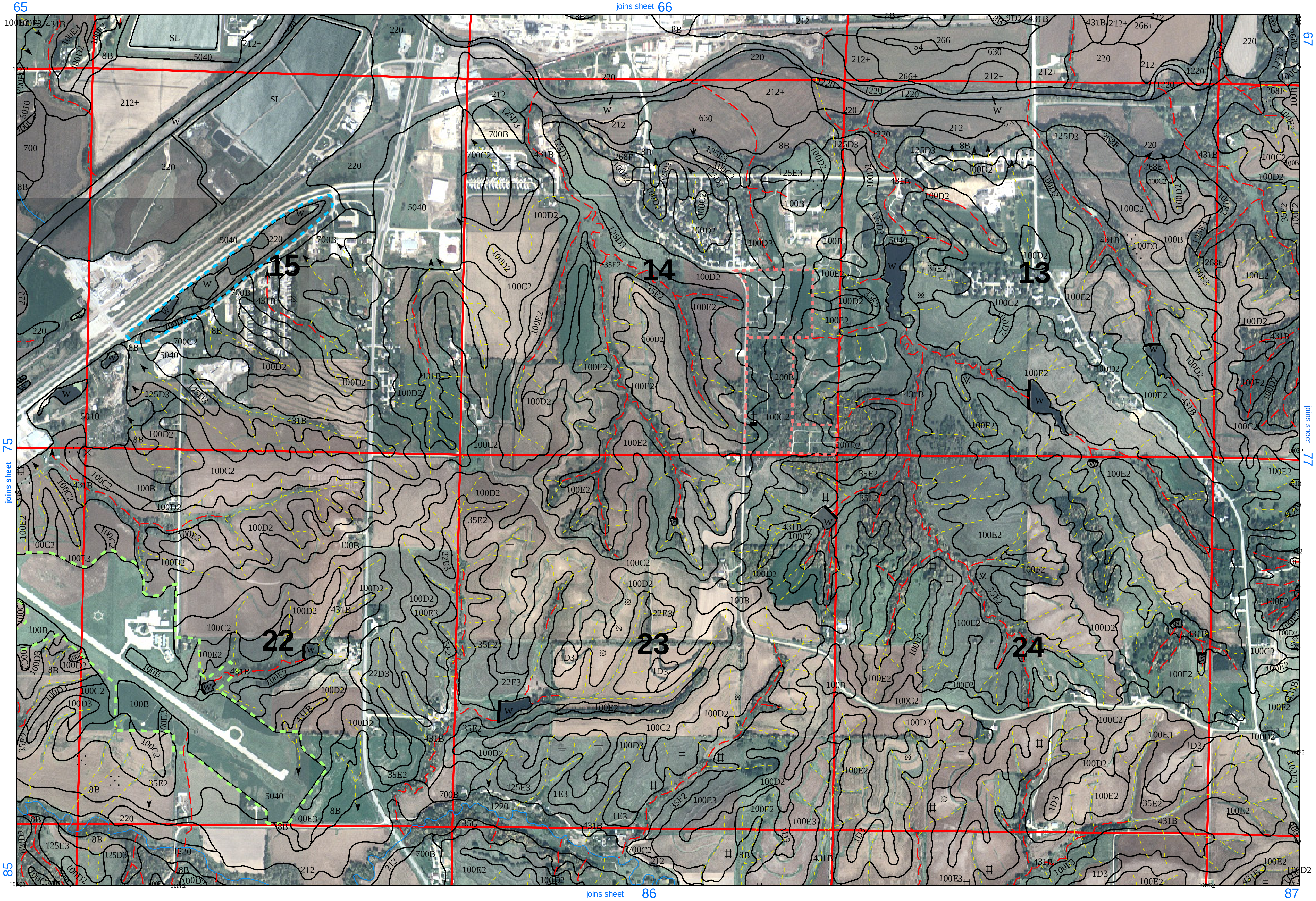
United States Department of Agriculture
NRCS Natural Resources Conservation Service

76

Township 83N Range 39W

76



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

77

Township 83N Range 38W

77

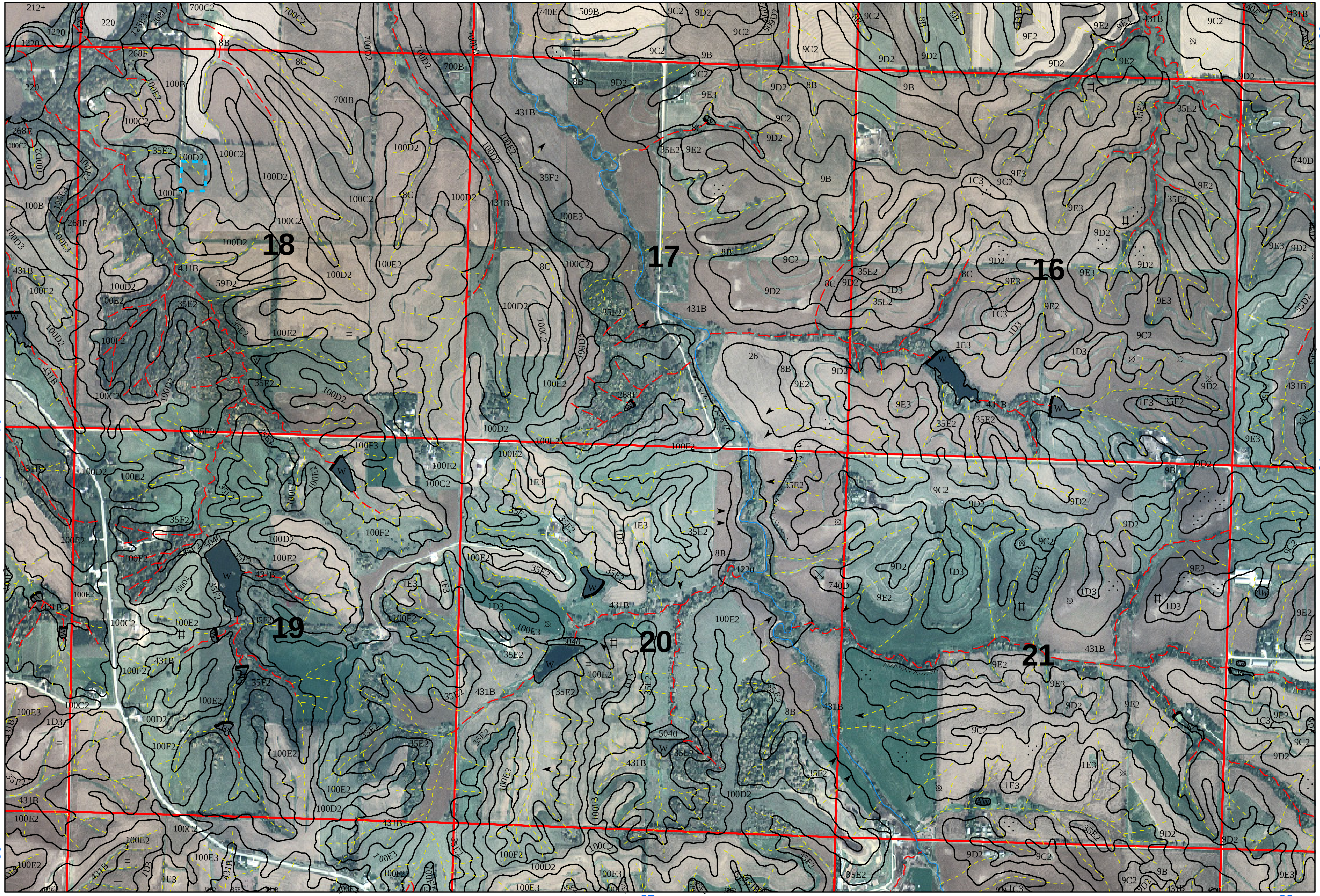
joins sheet 67

66

68

joins sheet 76

joins sheet 78



86

joins sheet 87

88

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 38W

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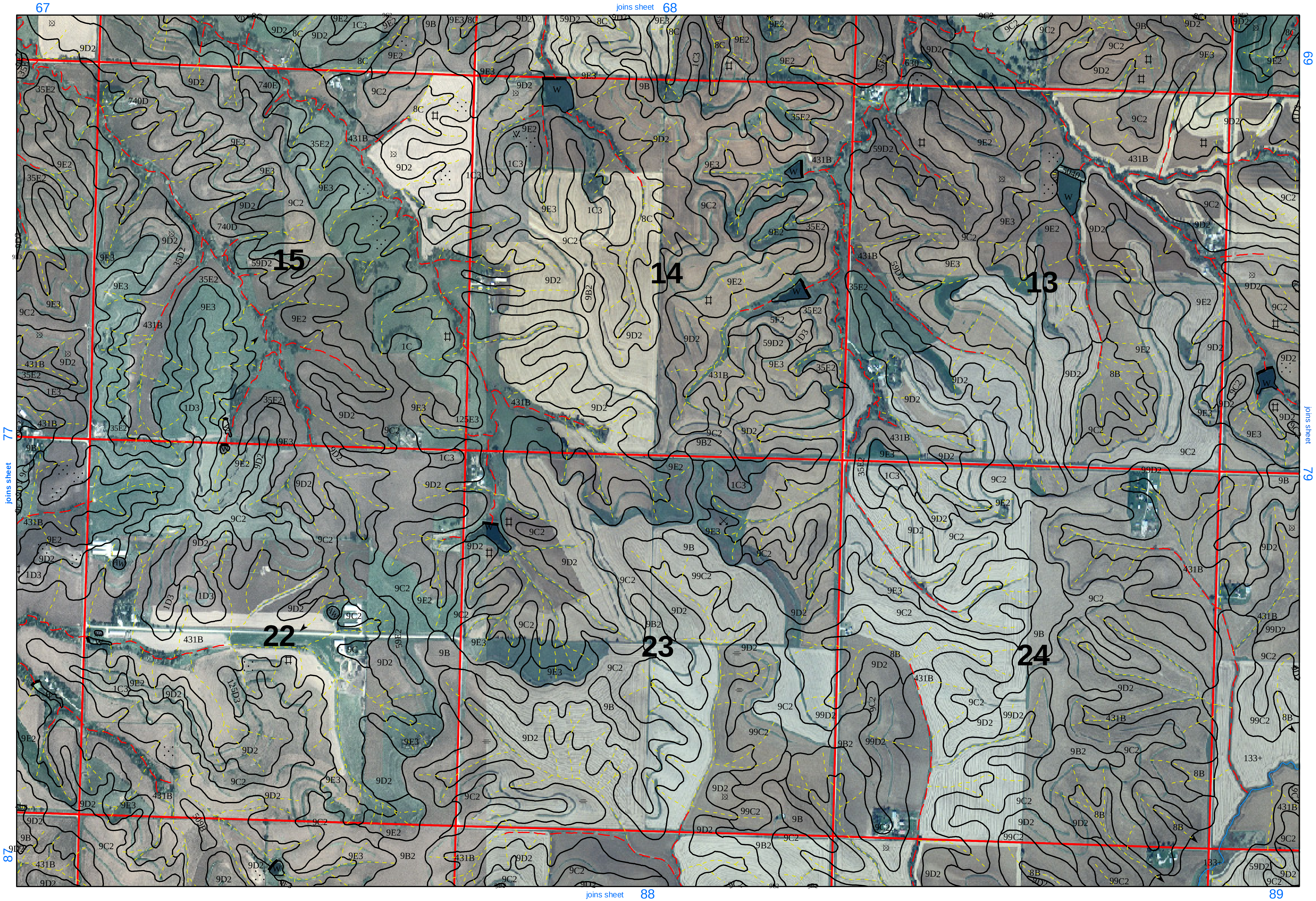

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 37W

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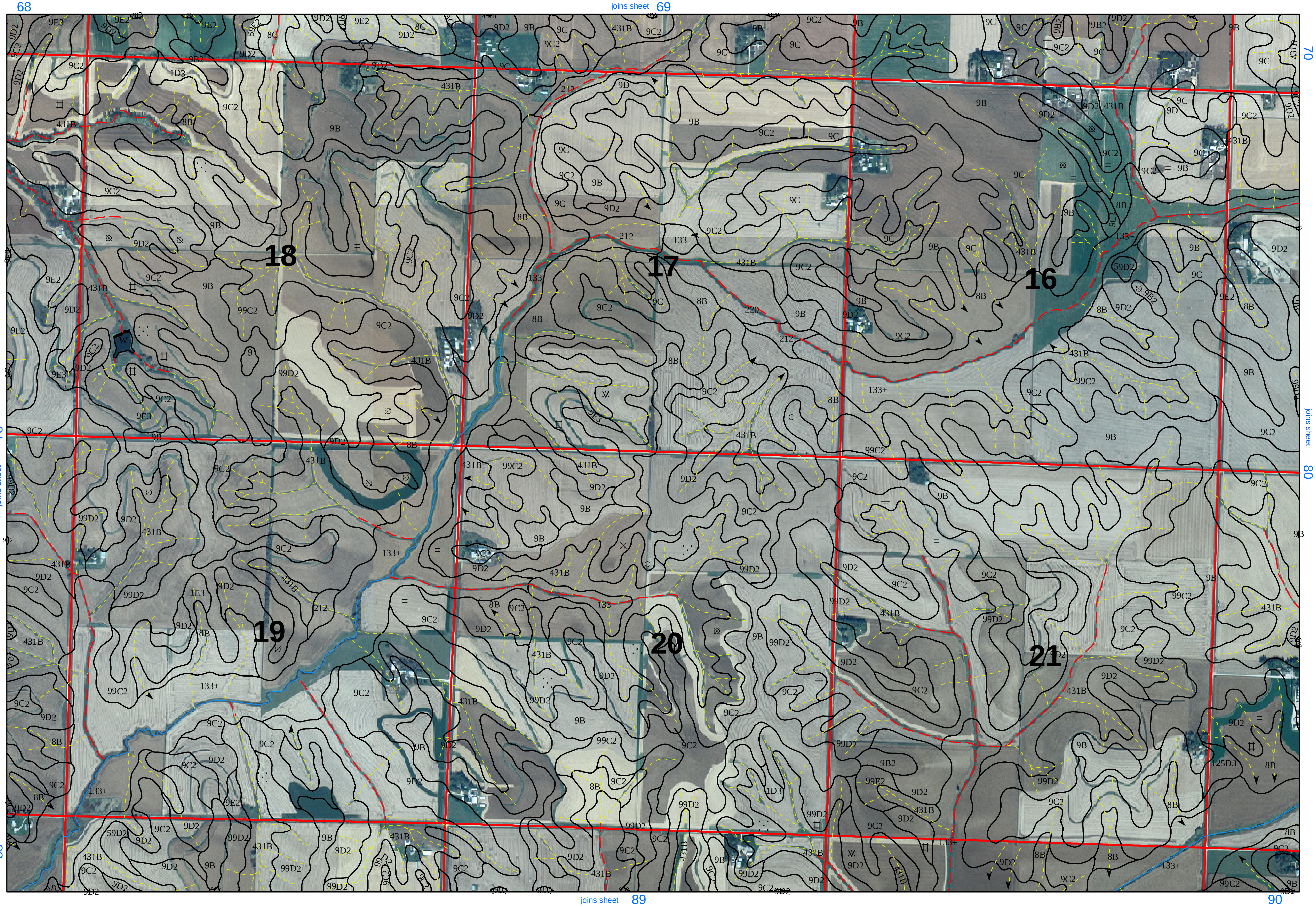

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 83N Range 37W

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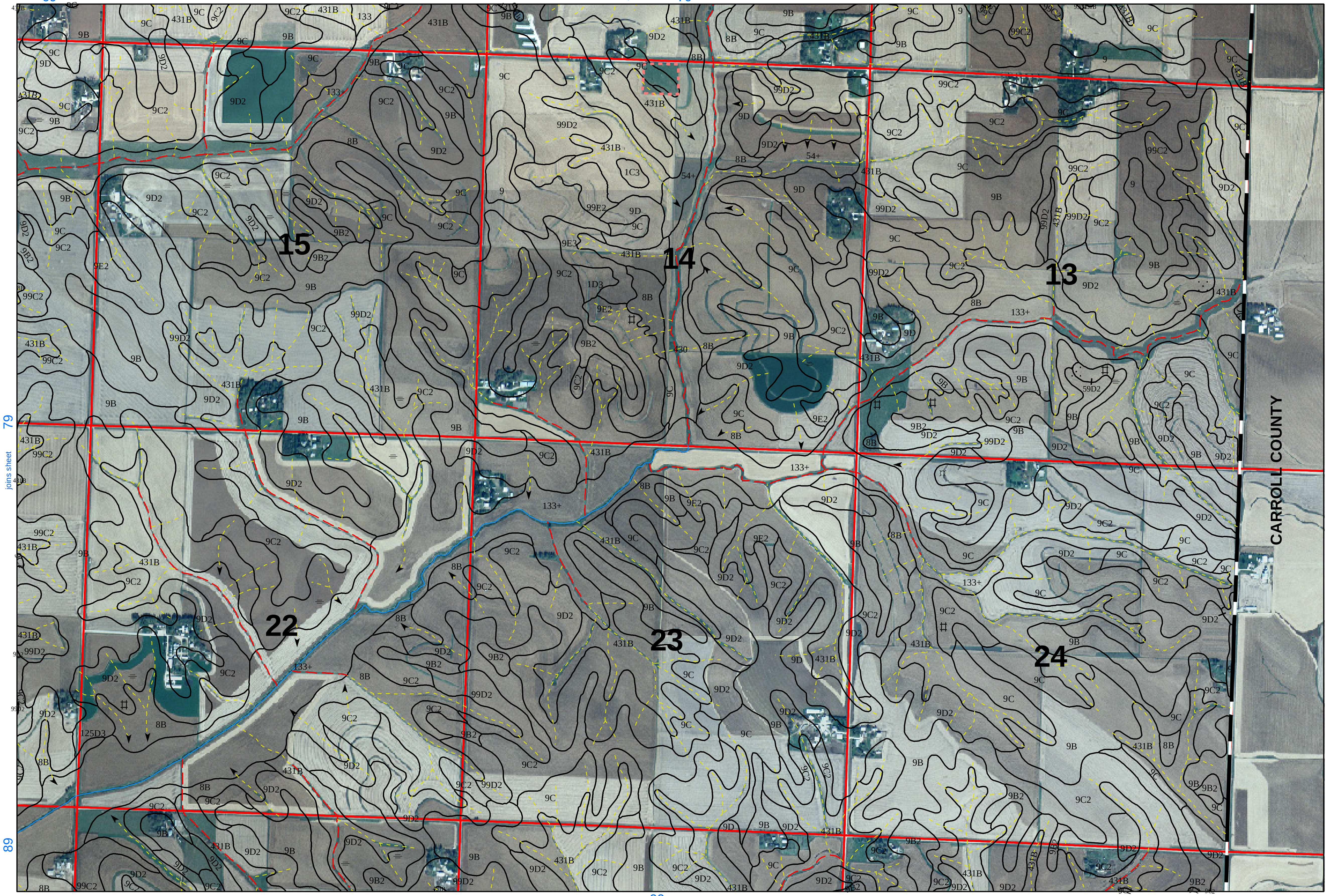
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

69 joins sheet 70

joins sheet 79

89



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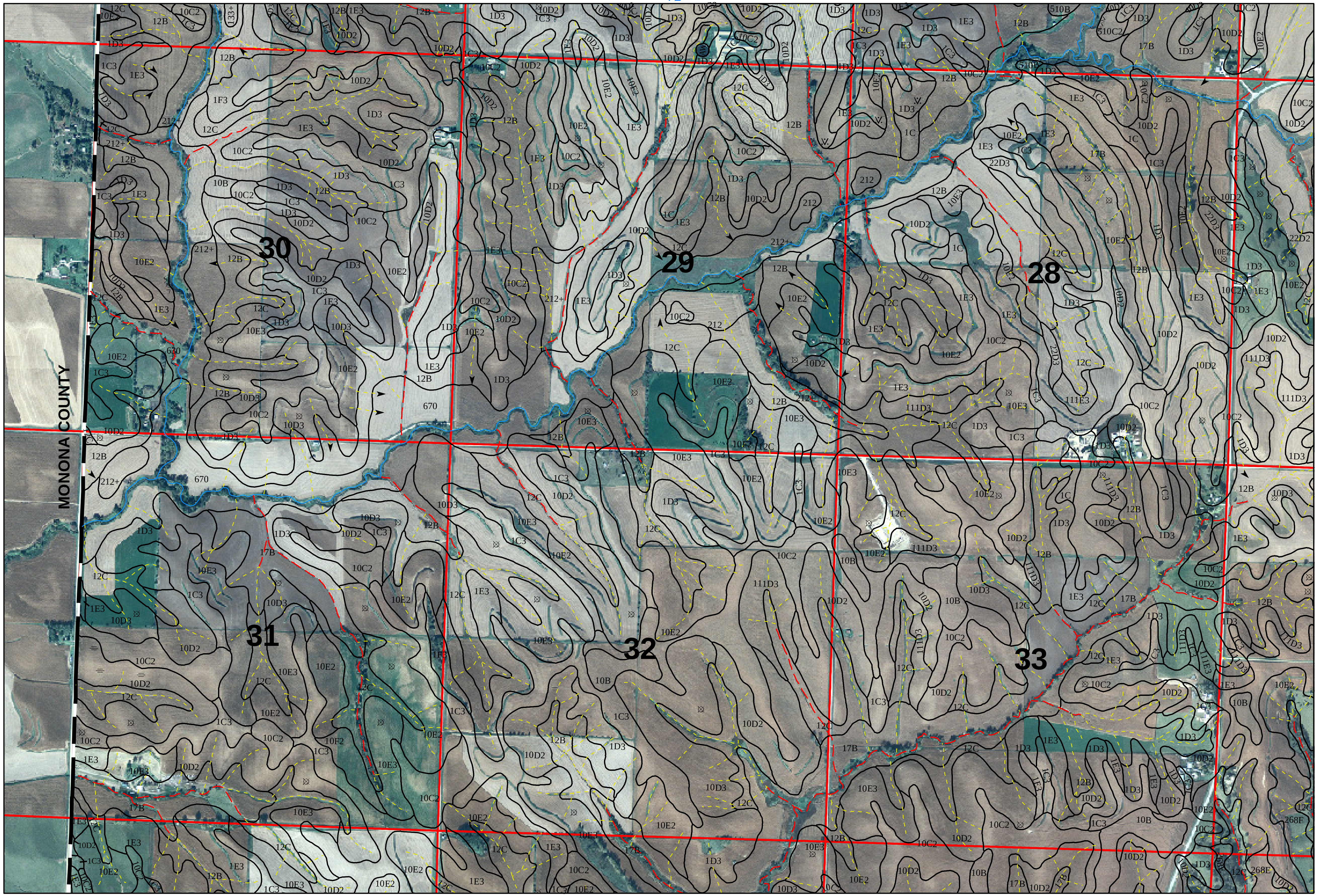
0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 41W

joins sheet 71



joins sheet 91

92

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

81

82

Township 83N Range 41W

82

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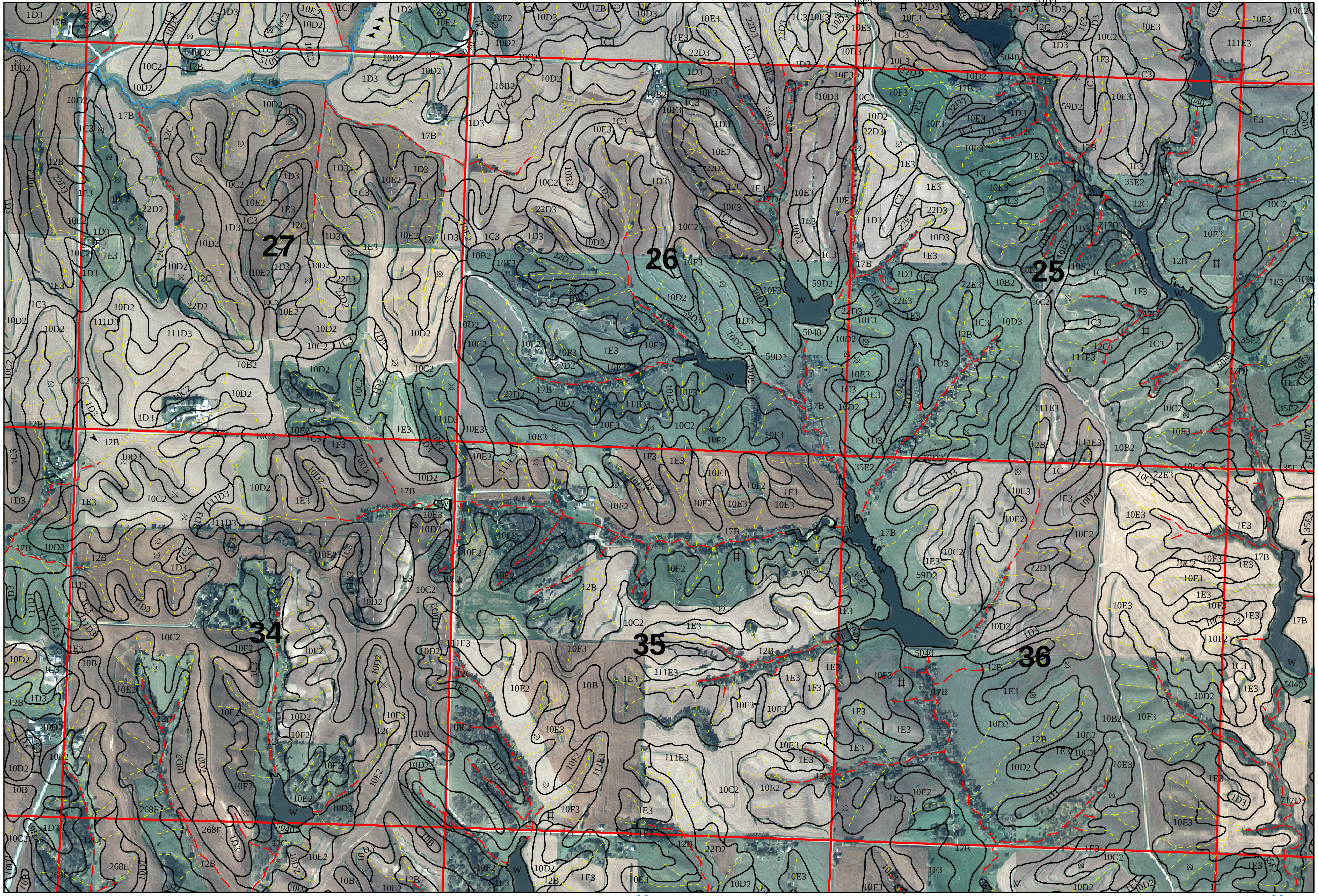
71 joins sheet 72



joins sheet 92

93

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

83

Township 83N Range 40W

83

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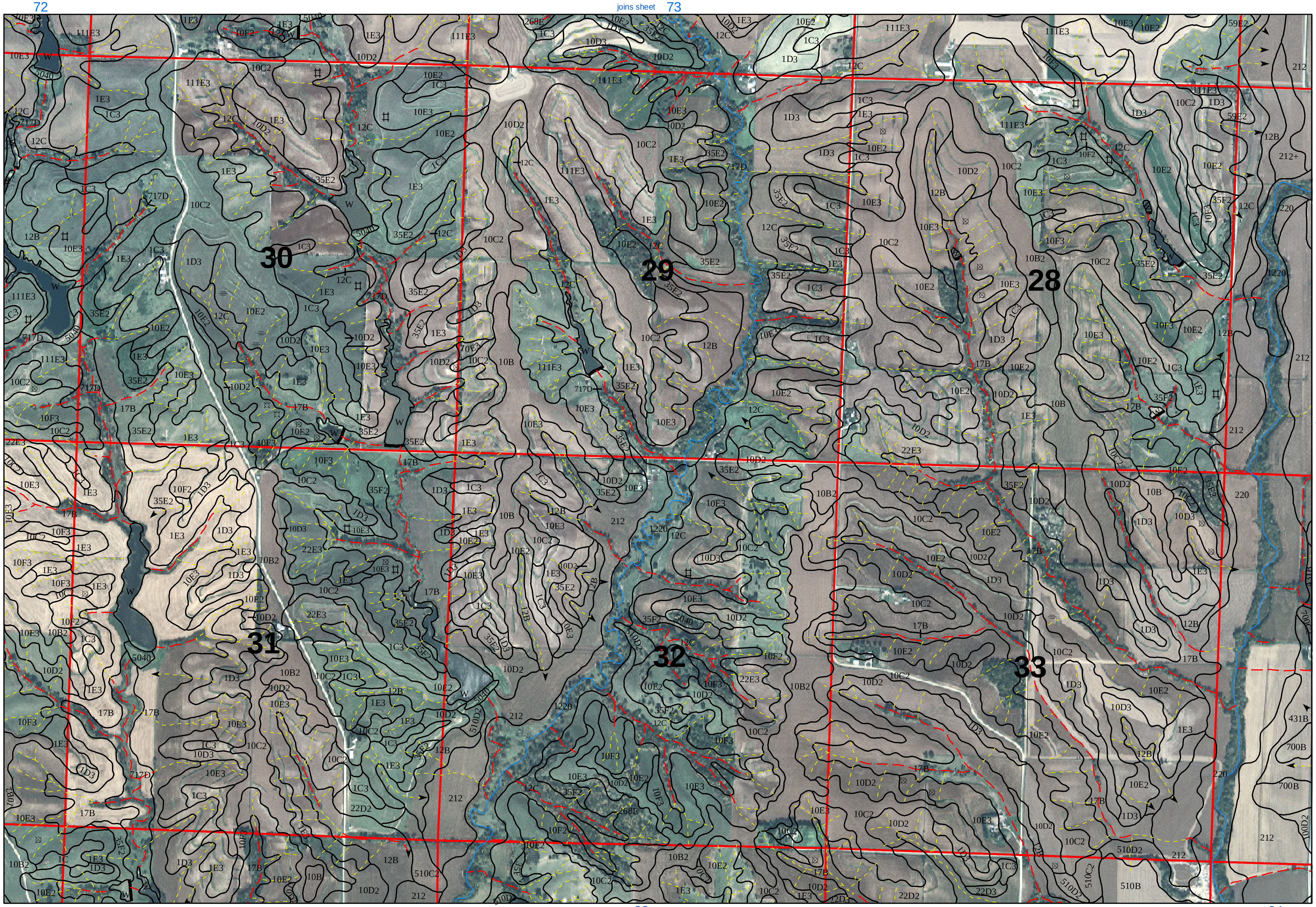

0 1/4 1/2 3/4 1 Miles

Feet
0 1,000 2,000 3,000 4,000 5,000

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 40W

84

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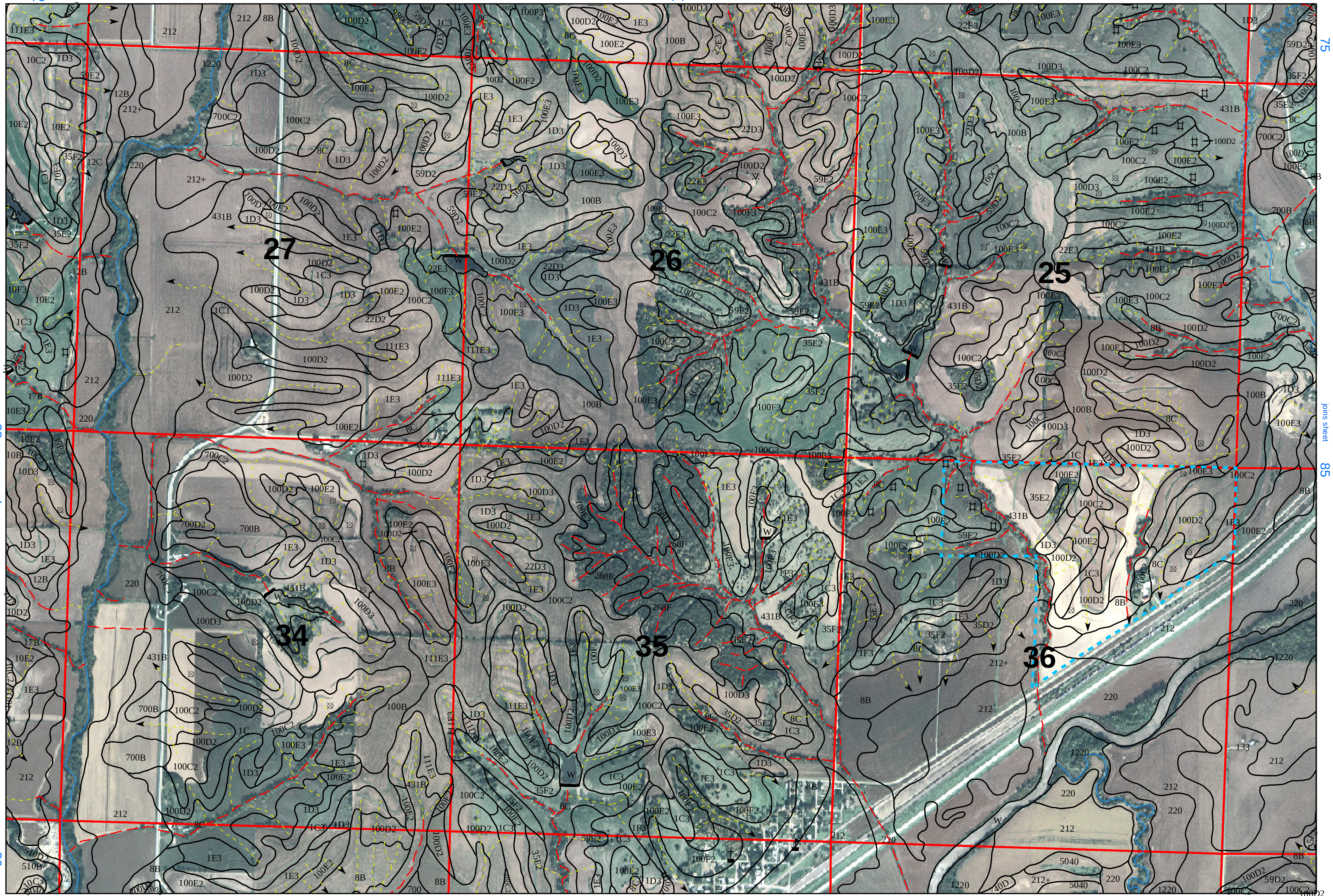
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables.
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United States Department of Agriculture
NRCS Natural Resources Conservation Service

85

Township 83N Range 39W

85

Soil Survey of Crawford County, Iowa

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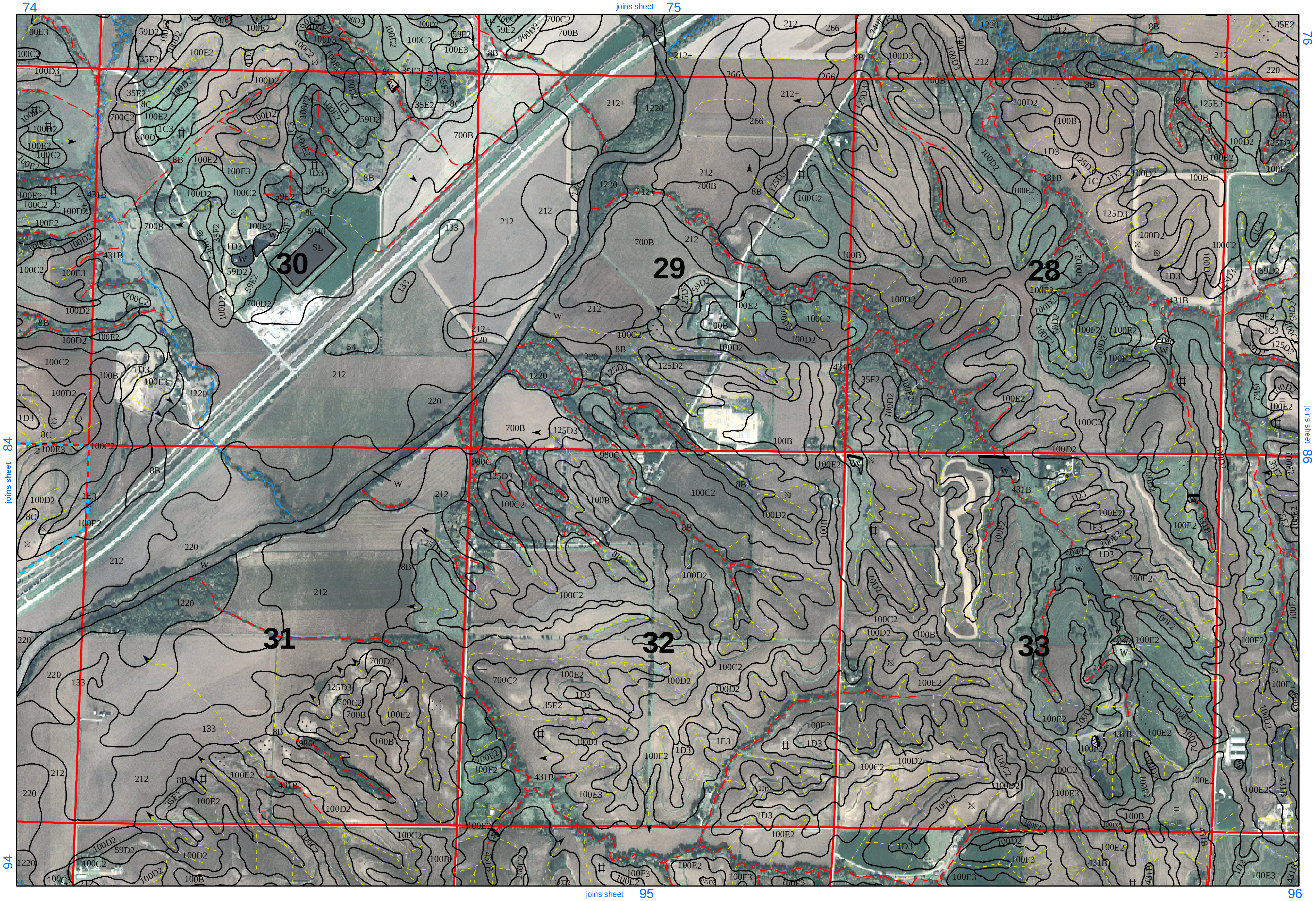

0	1/4	1/2	3/4	1 Miles

0	1,000	2,000	3,000	4,000	5,000 Feet

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United States Department of Agriculture
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Township 83N Range 39W

Soil Survey of Crawford County, Iowa

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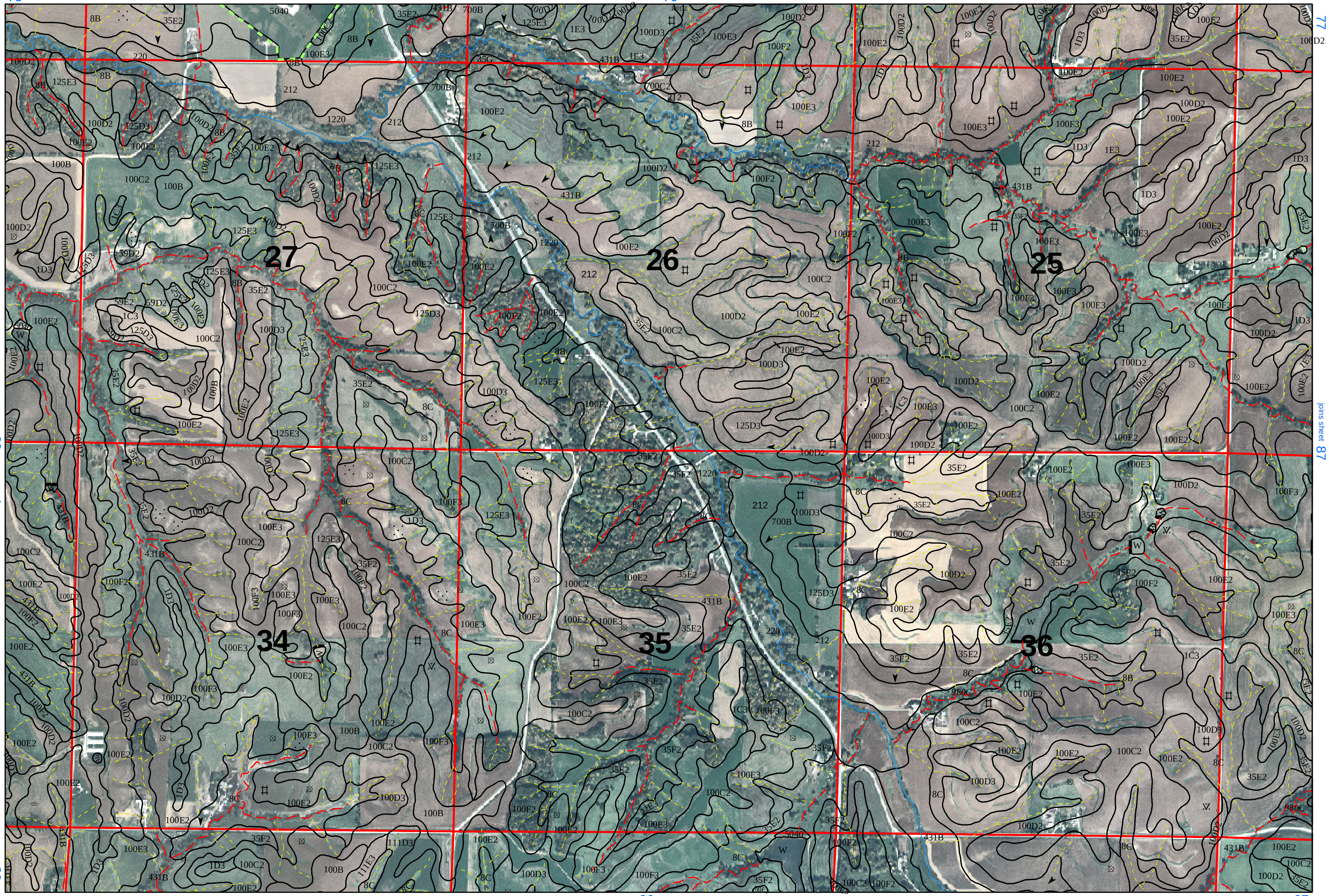
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

75 joins sheet 76 77



joins sheet 85 — joins sheet 87

95 joins sheet 96 97

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
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Township 83N Range 38W

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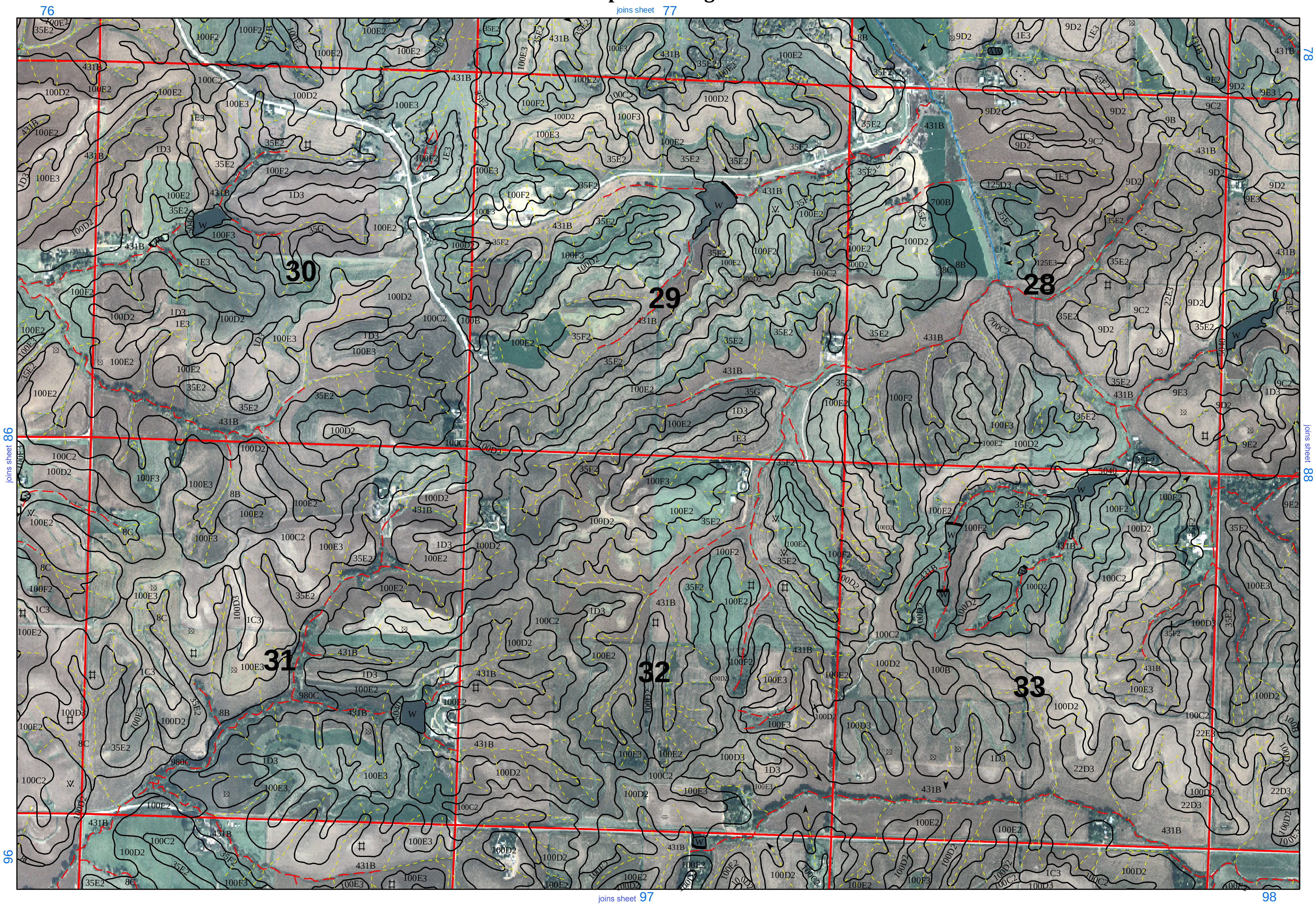
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.



0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 83N Range 38W

88

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

77

joins sheet 78

79

joins sheet 87

joins sheet 89

97

joins sheet 98

99

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 37W

Soil Survey of Crawford County, Iowa

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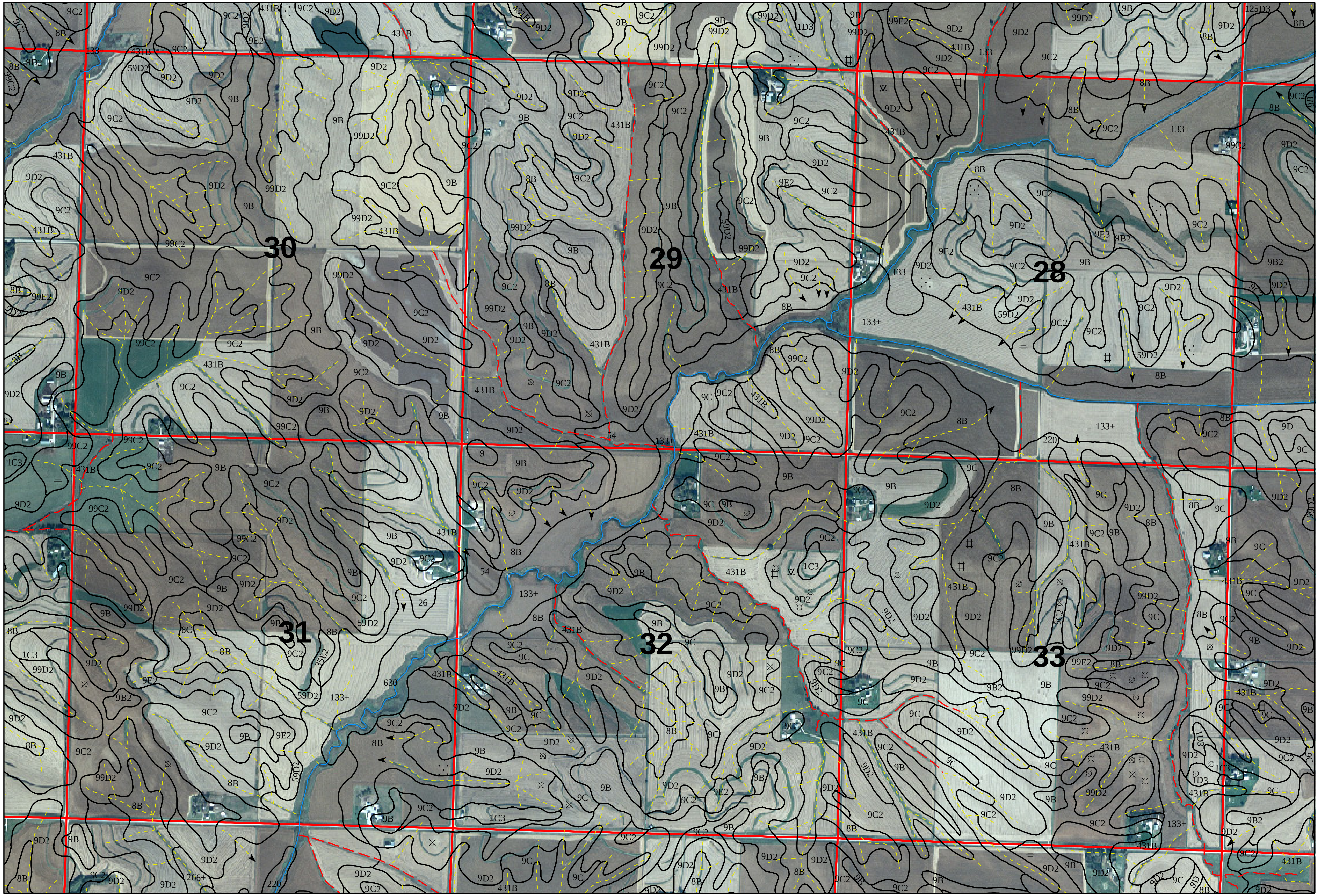

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 83N Range 37W

90

79

joins sheet 80

89
joins sheet

99

joins sheet 100

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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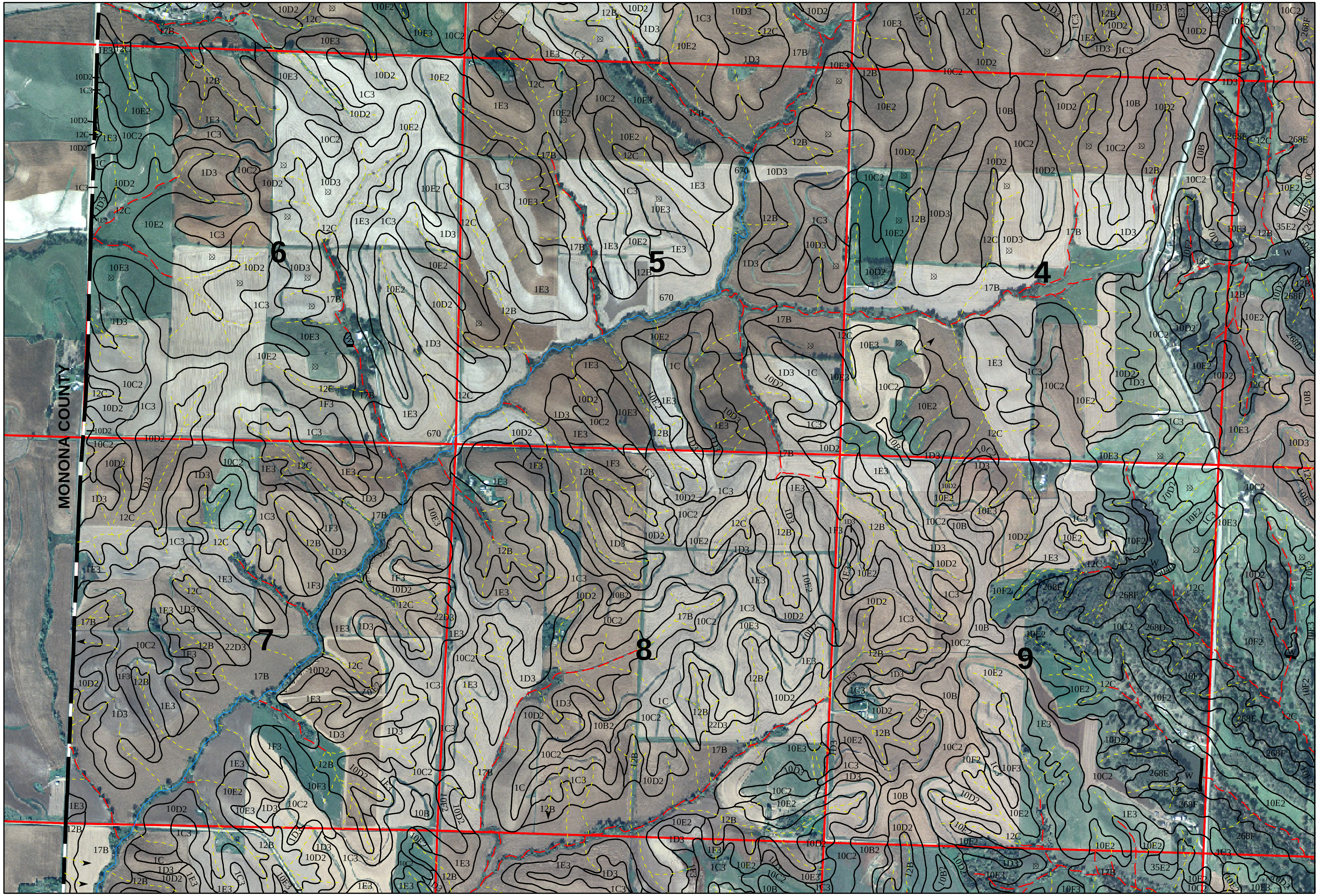
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 41W

joins sheet 81



joins sheet 101

102

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
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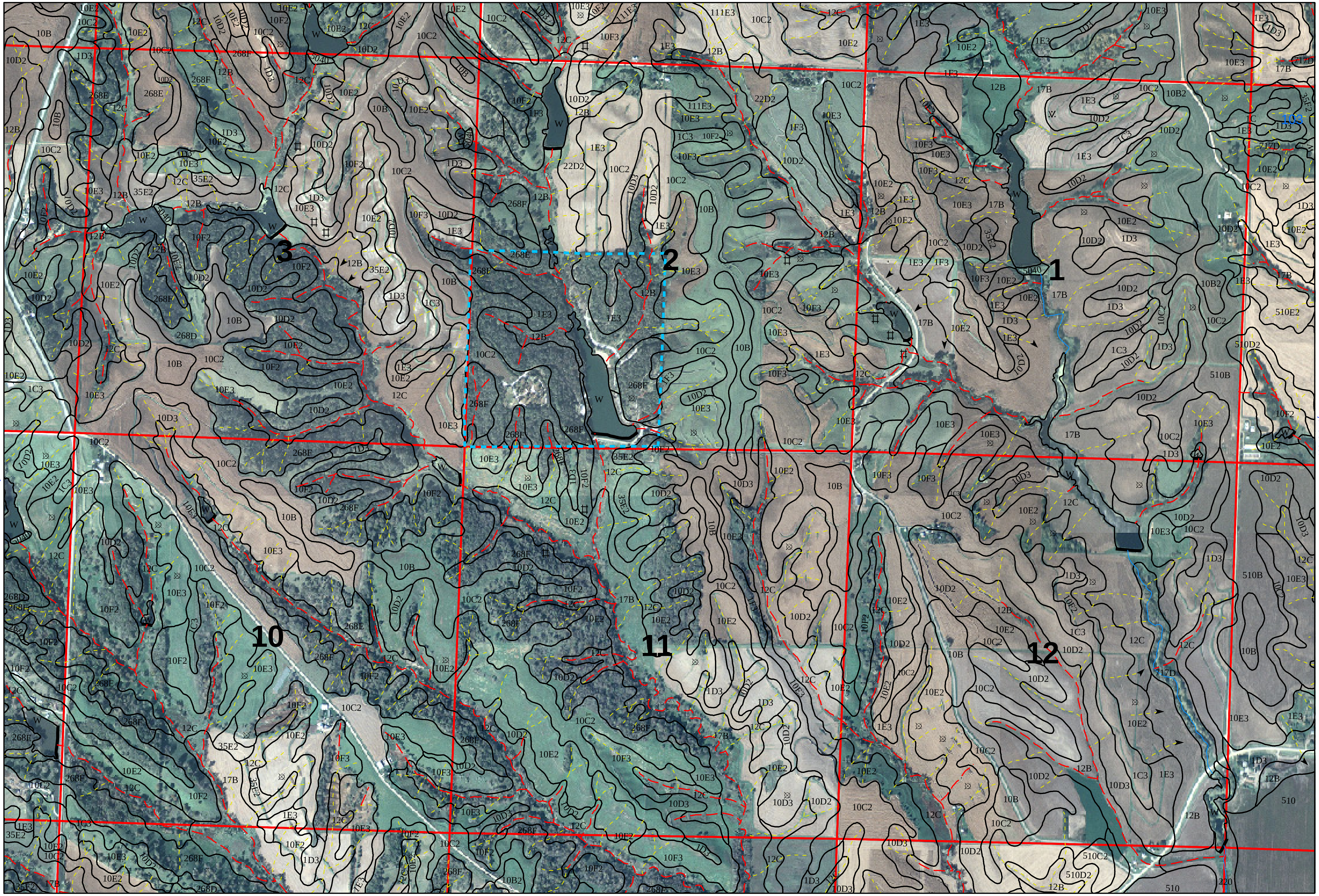
Township 82N Range 41W



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
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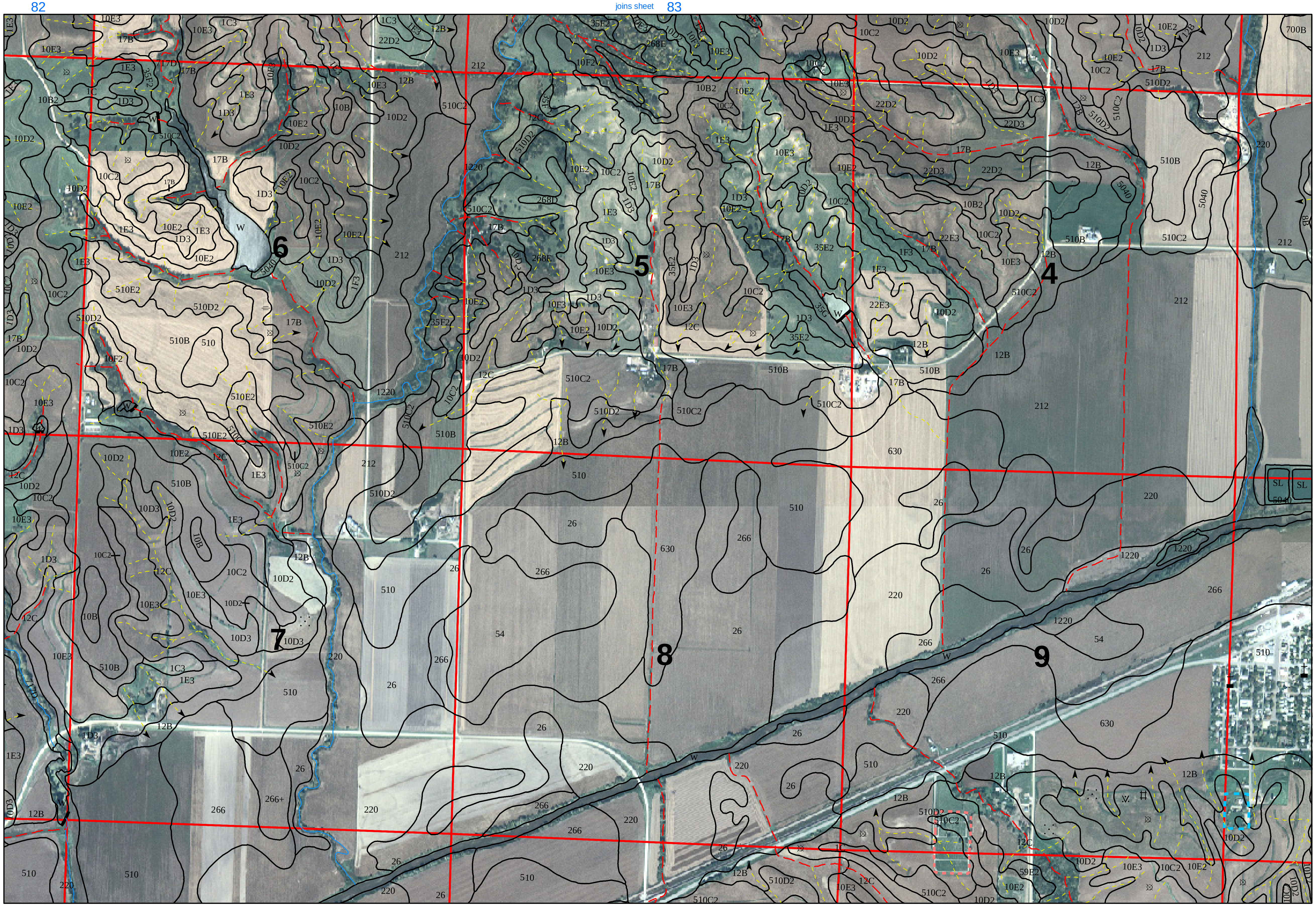
Township 82N Range 40W



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 40W

Soil Survey of Crawford County, Iowa

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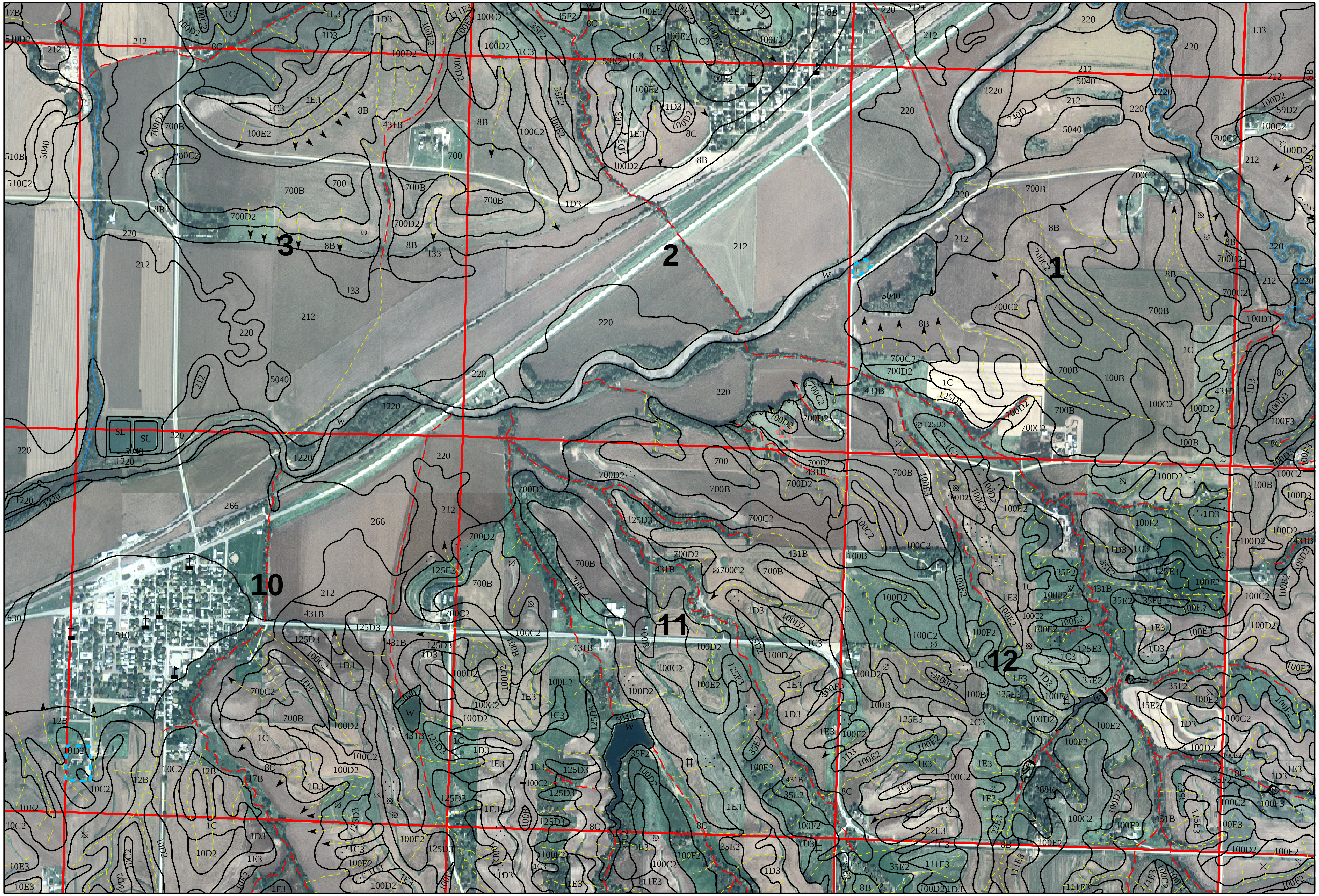

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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Township 82N Range 39W

95

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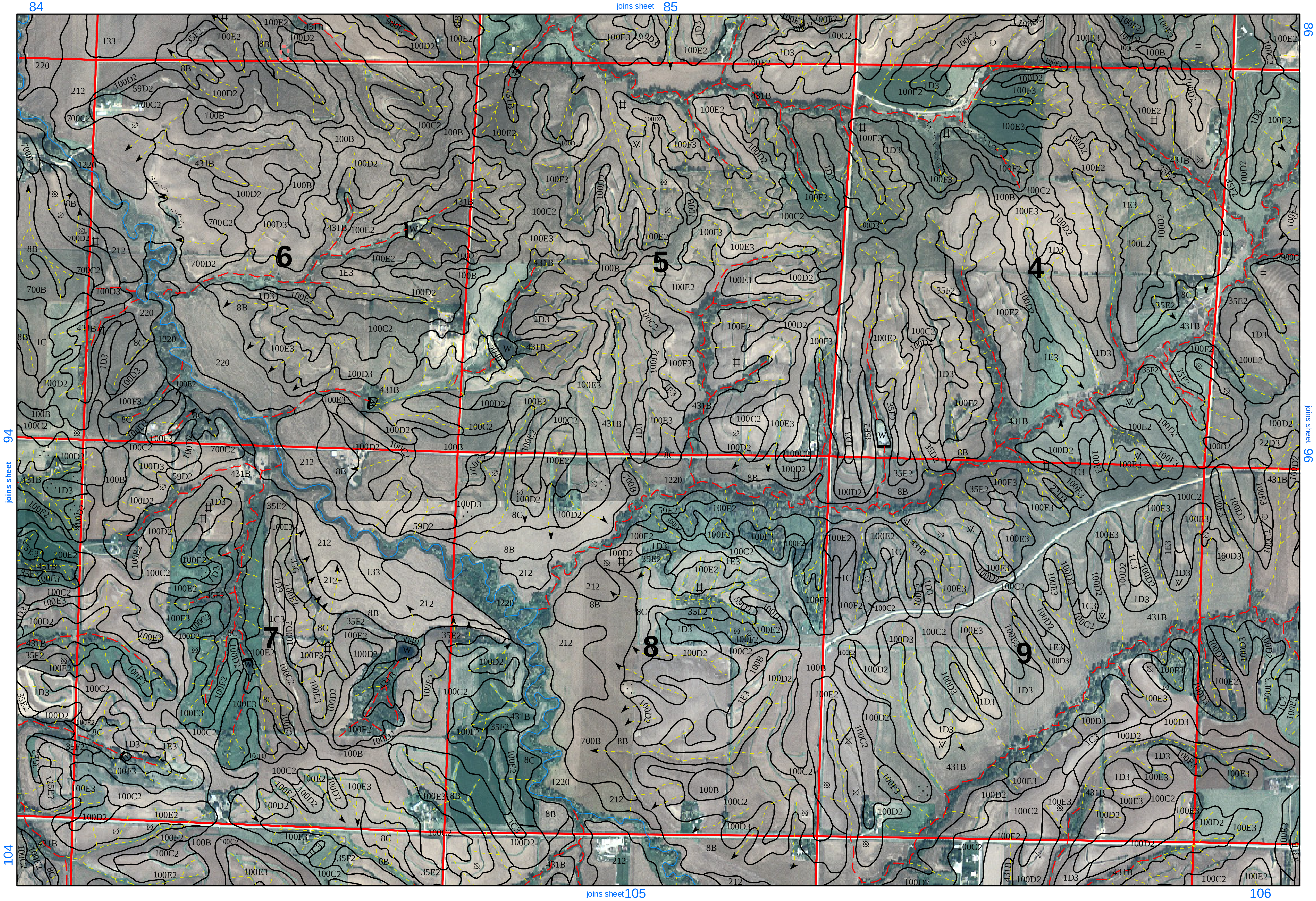

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 39W

96

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0 1/4 1/2 3/4 1 Miles

Feet

0 1,000 2,000 3,000 4,000 5,000

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 38W

97

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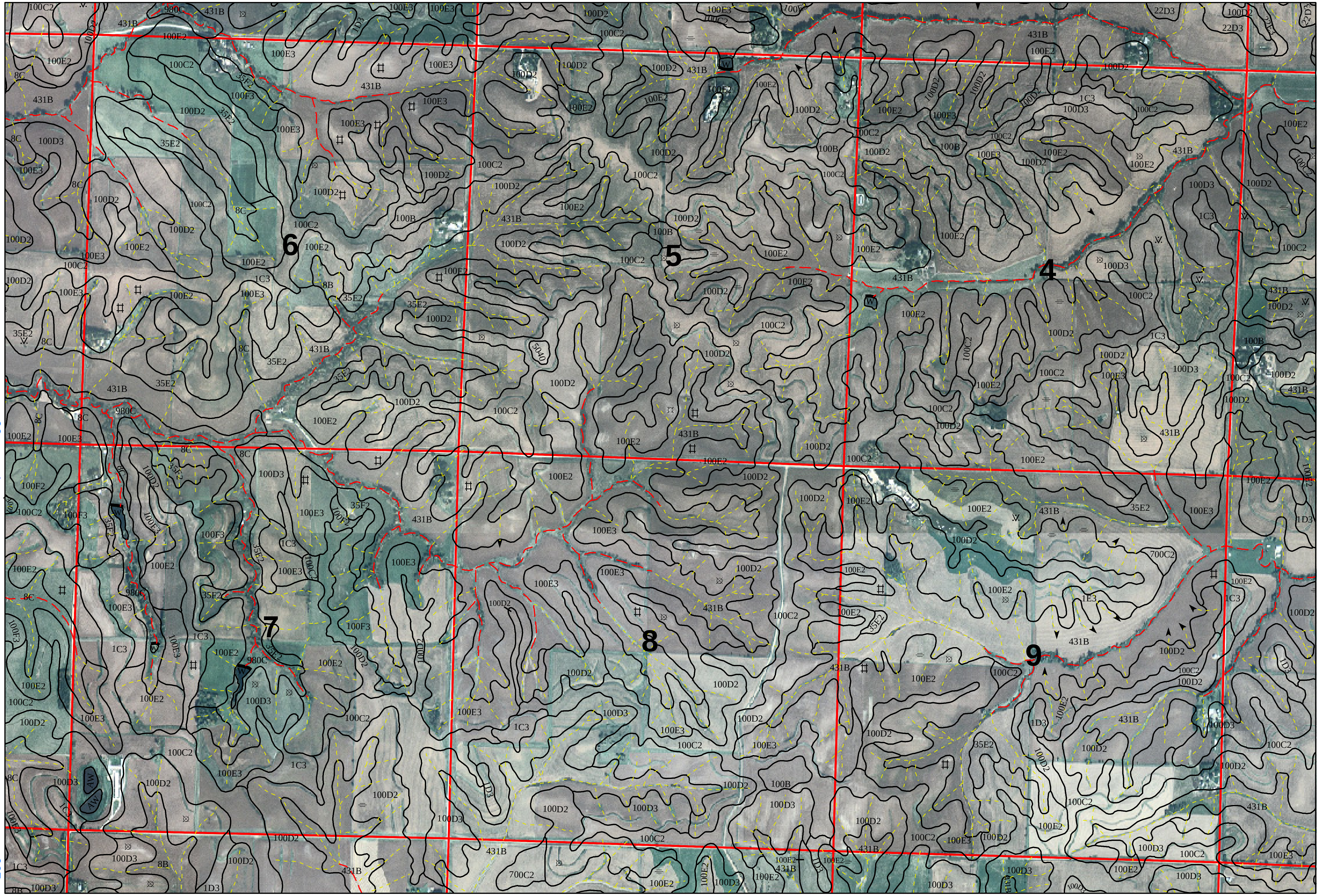

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 38W

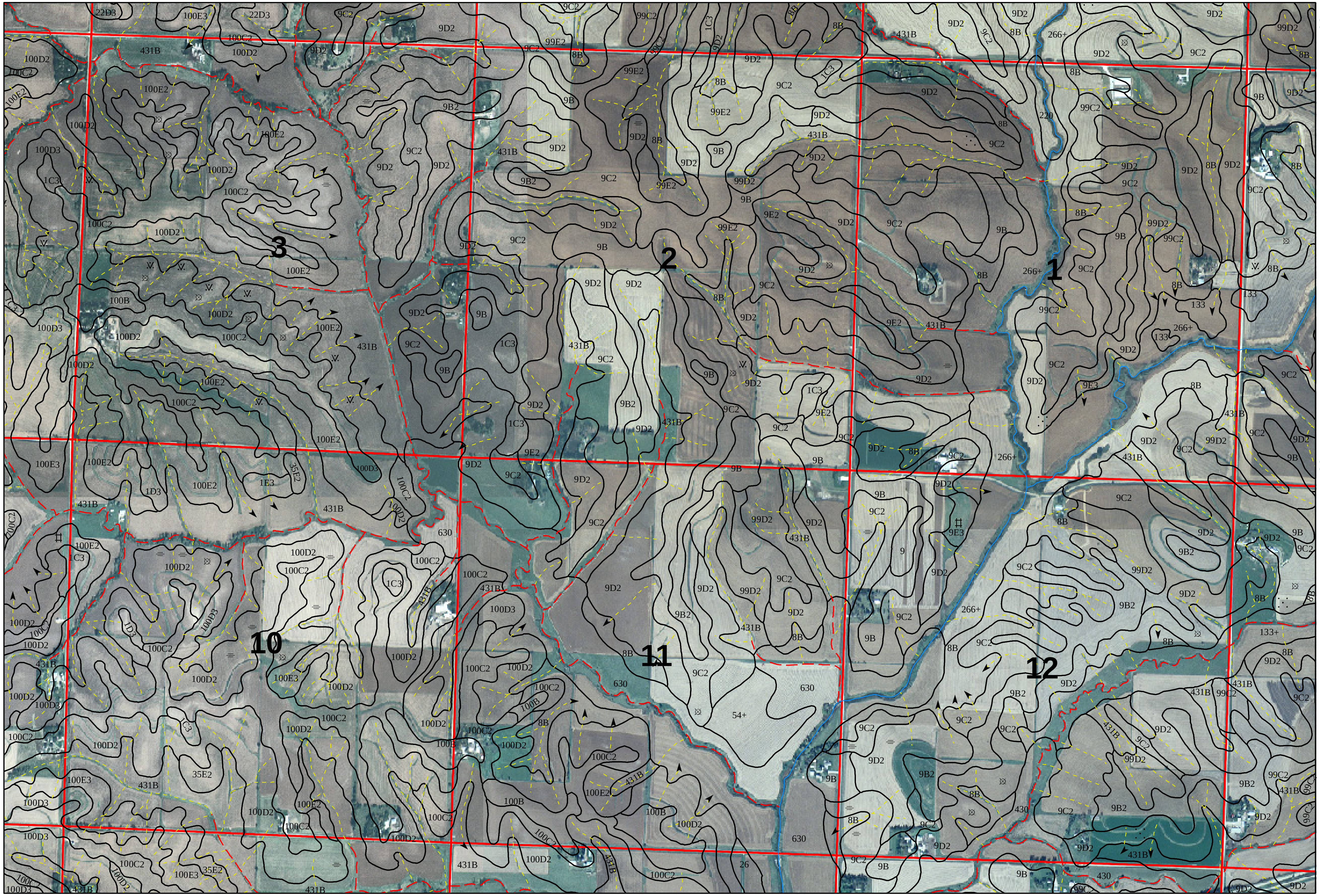
87 joins sheet 88

89

joins sheet 99

97 joins sheet

107



joins sheet 108

109

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 37W

99

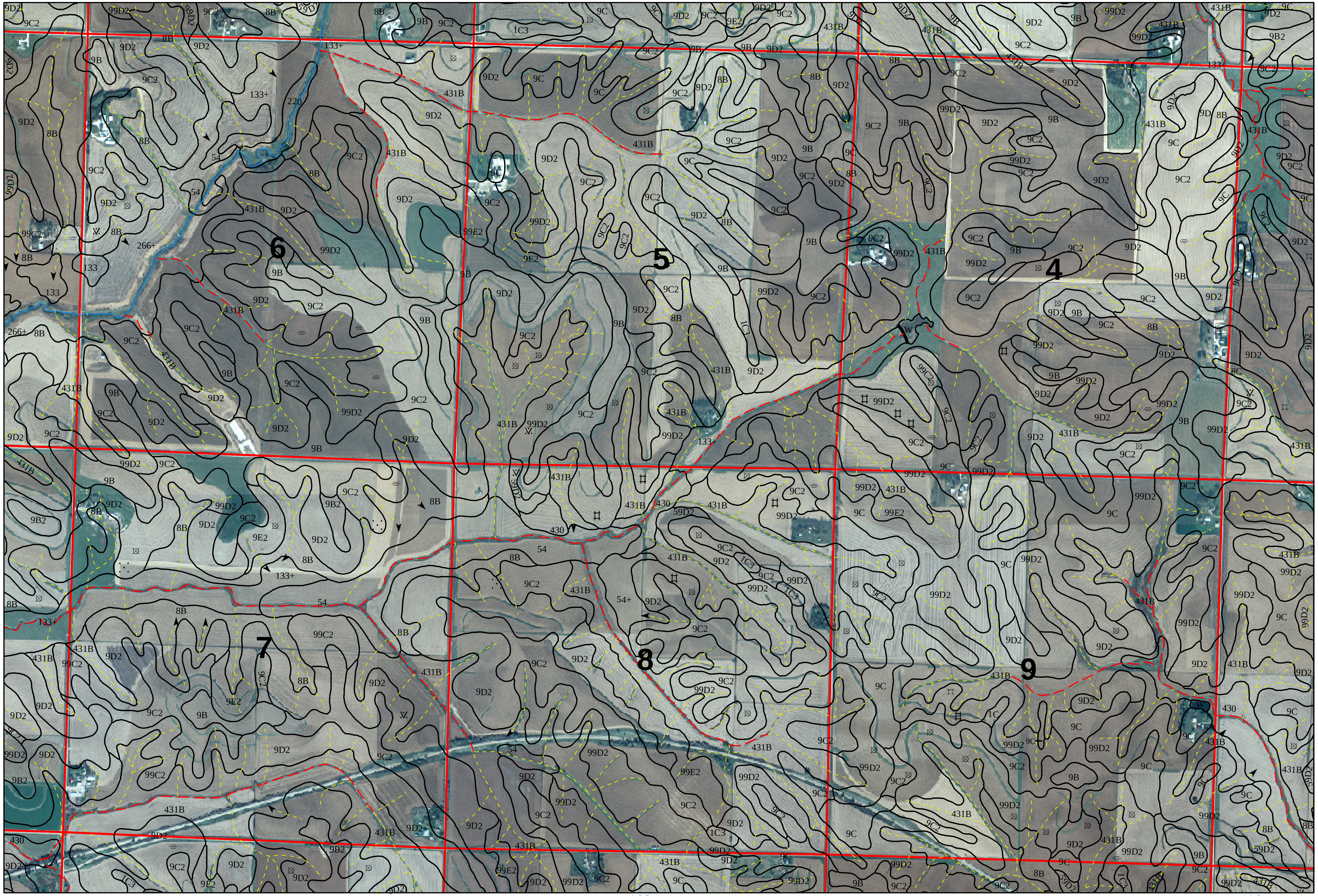
88

joins sheet 89

90

joins sheet 98

joins sheet 100



108

joins sheet 109

110

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 37W

89
joins sheet 90

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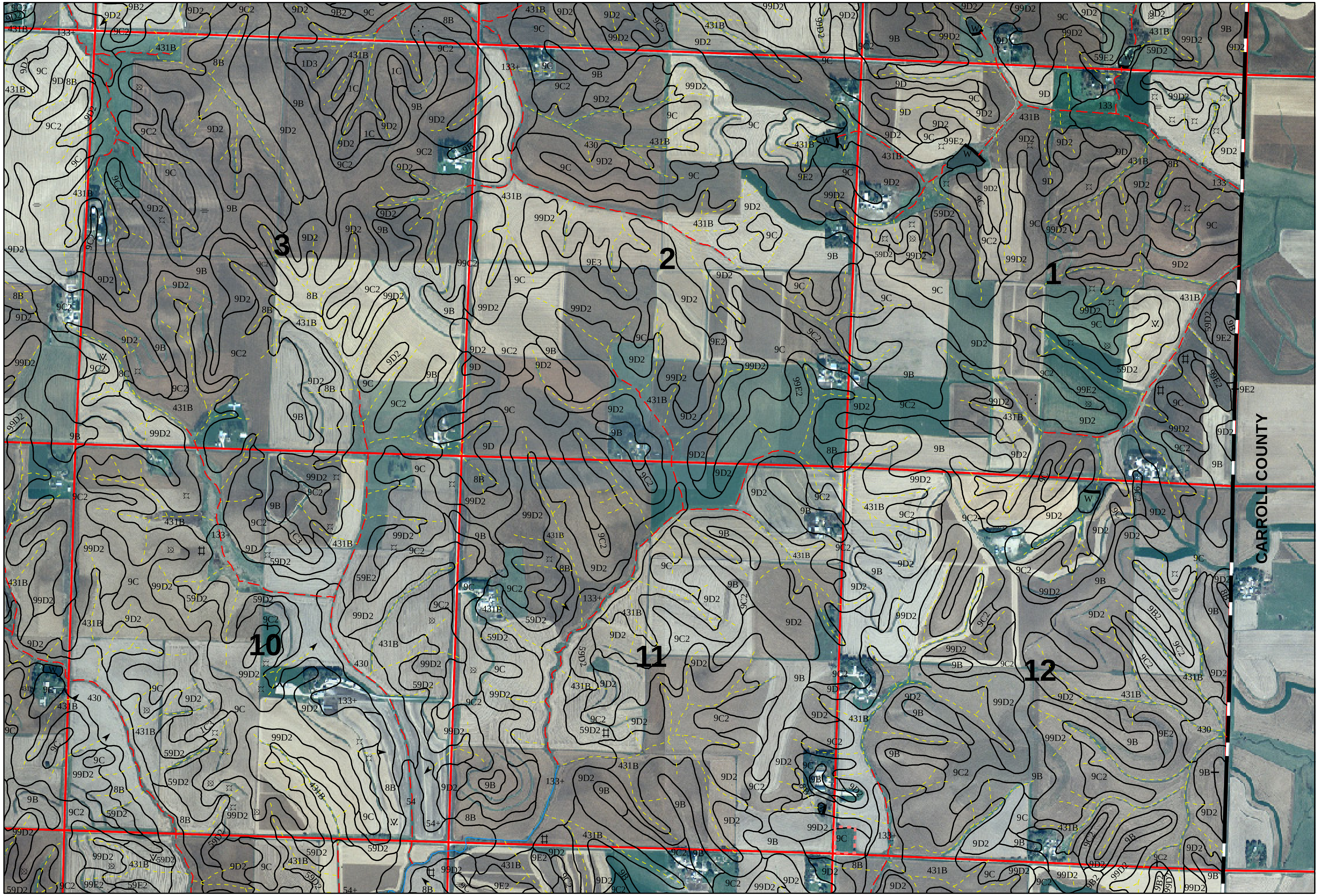
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

99
joins sheet
109



joins sheet 110

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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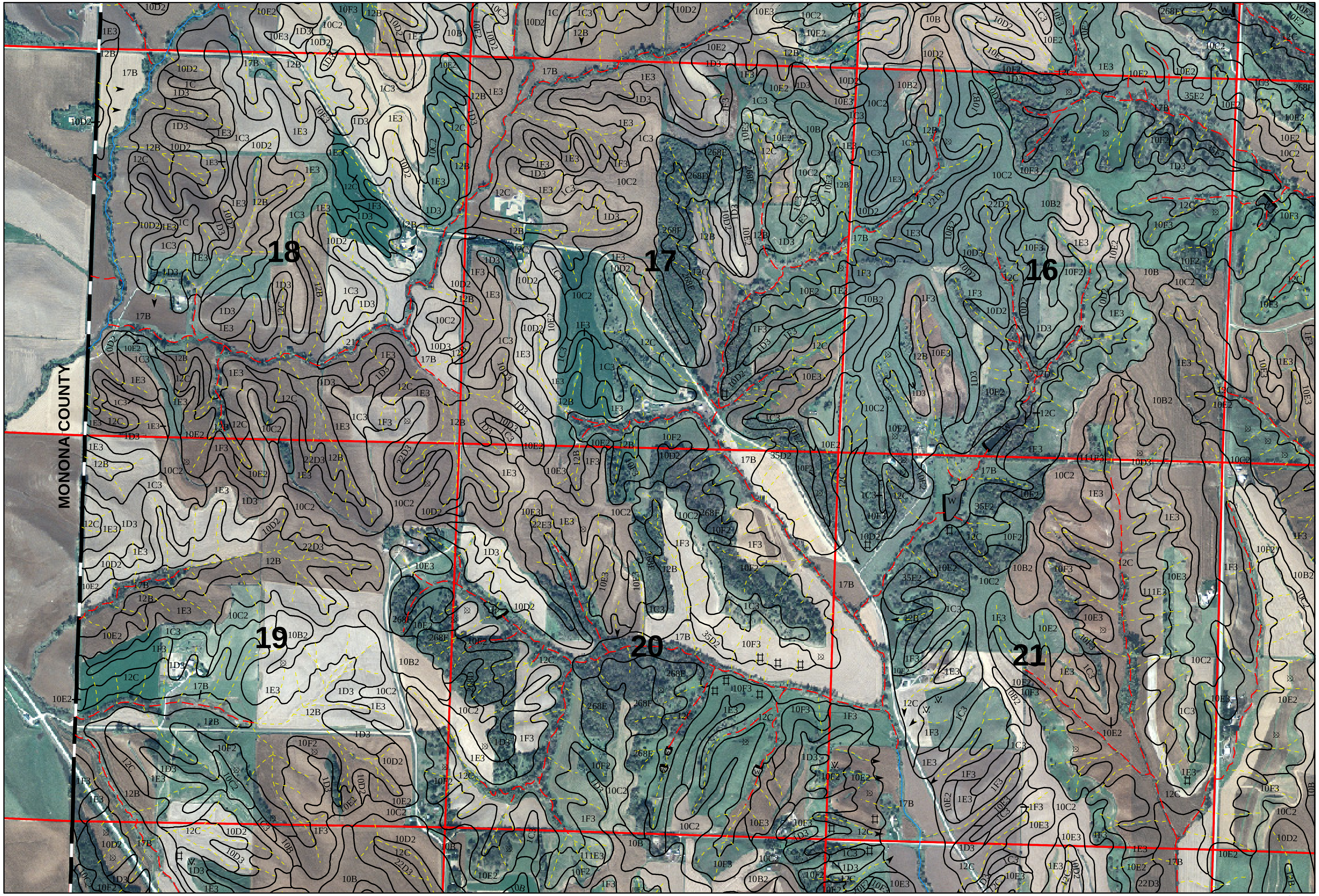
United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 41W

101

joins sheet 91



92

joins sheet 102

joins sheet 111

112

Soil Survey of Crawford County, Iowa

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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 41W

Soil Survey of Crawford County, Iowa

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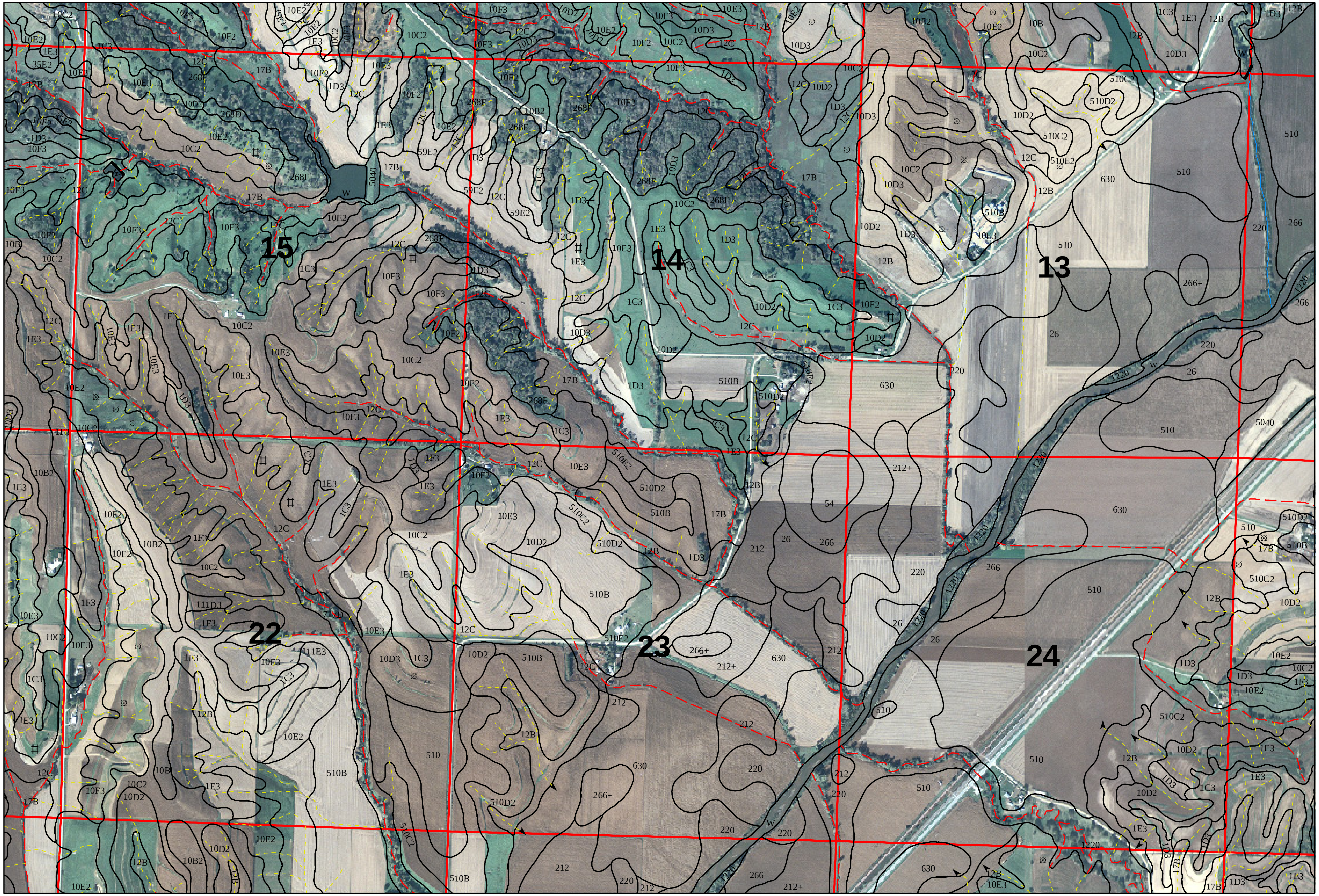
91 joins sheet 92 93



101 joins sheet 103

111 joins sheet 112 113

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
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Township 82N Range 40W

103

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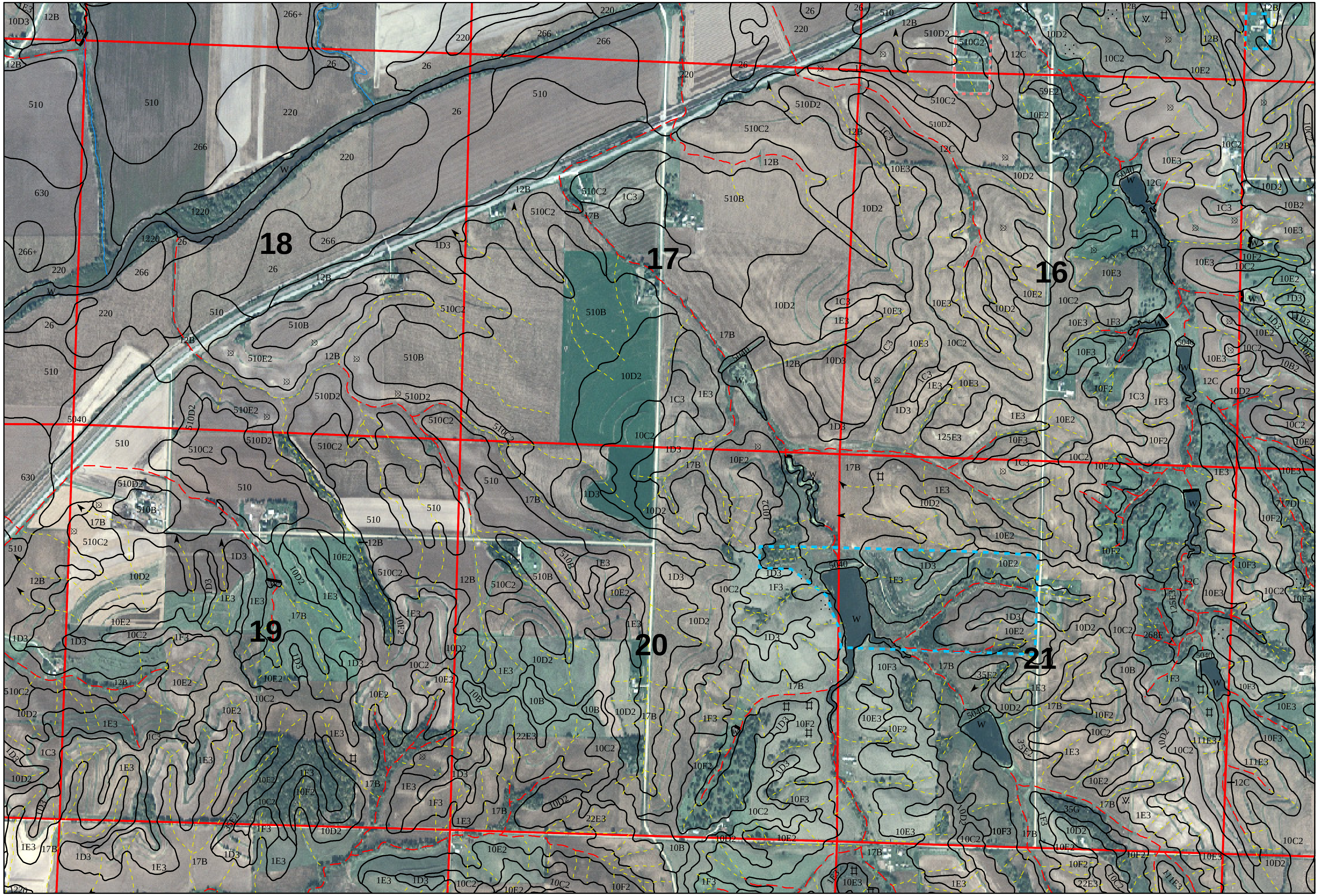

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
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Township 82N Range 40W

104

93 joins sheet 94 95

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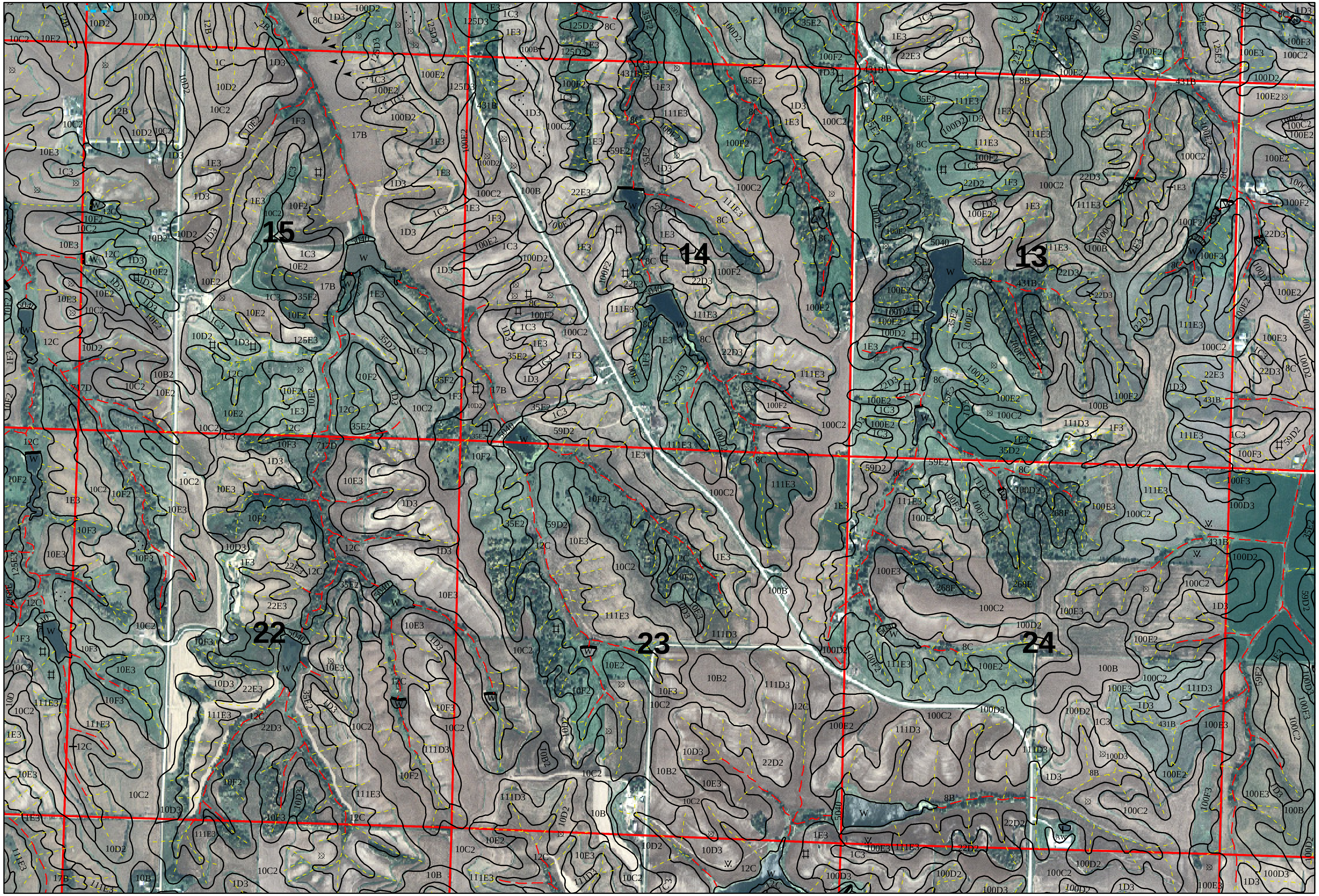
103 joins sheet



joins sheet 105

113 joins sheet 114 115

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0 1/4 1/2 3/4 1 Miles

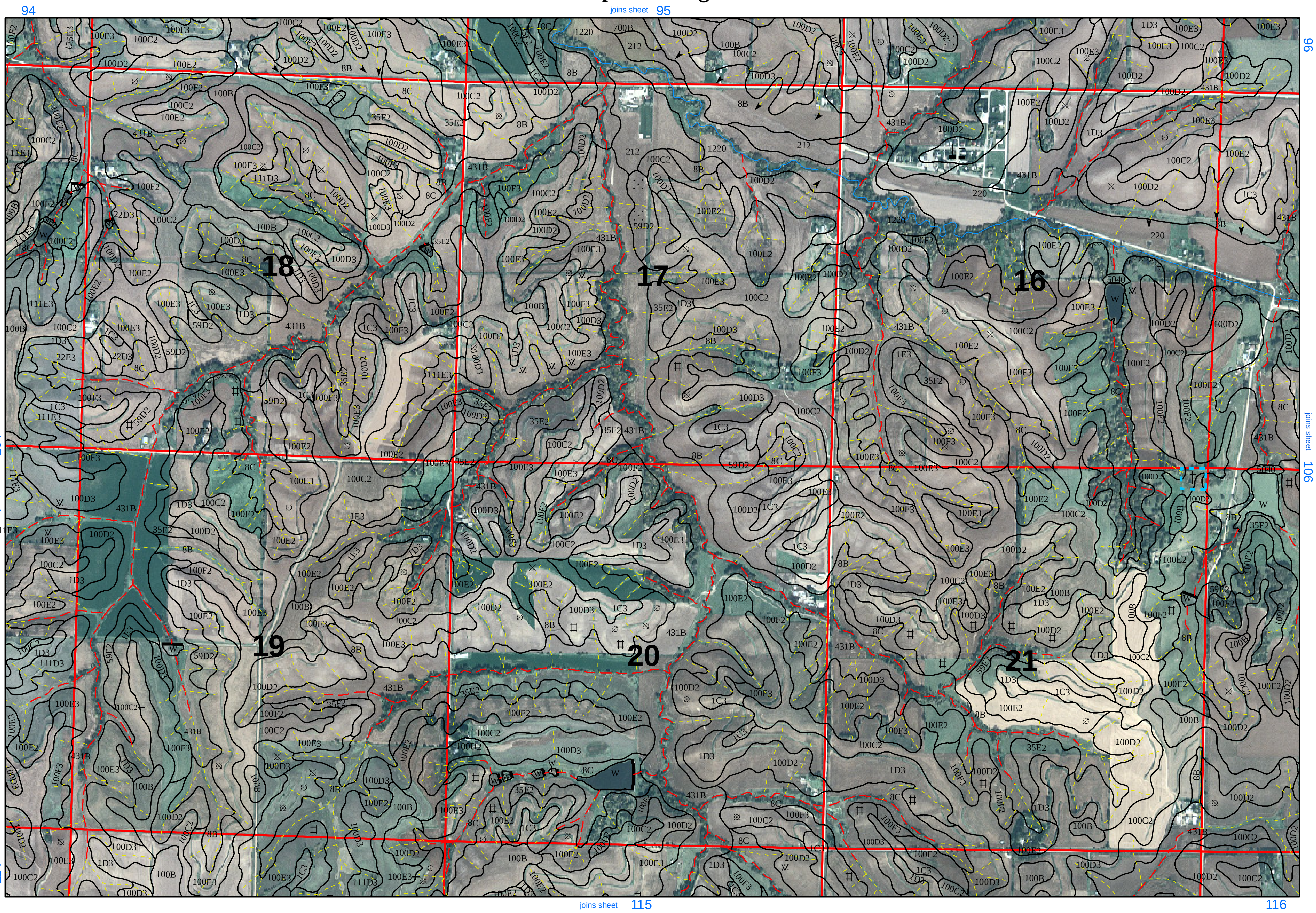
0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 39W

105



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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United States Department of Agriculture
NRCS Natural Resources Conservation Service

Township 82N Range 39W

106

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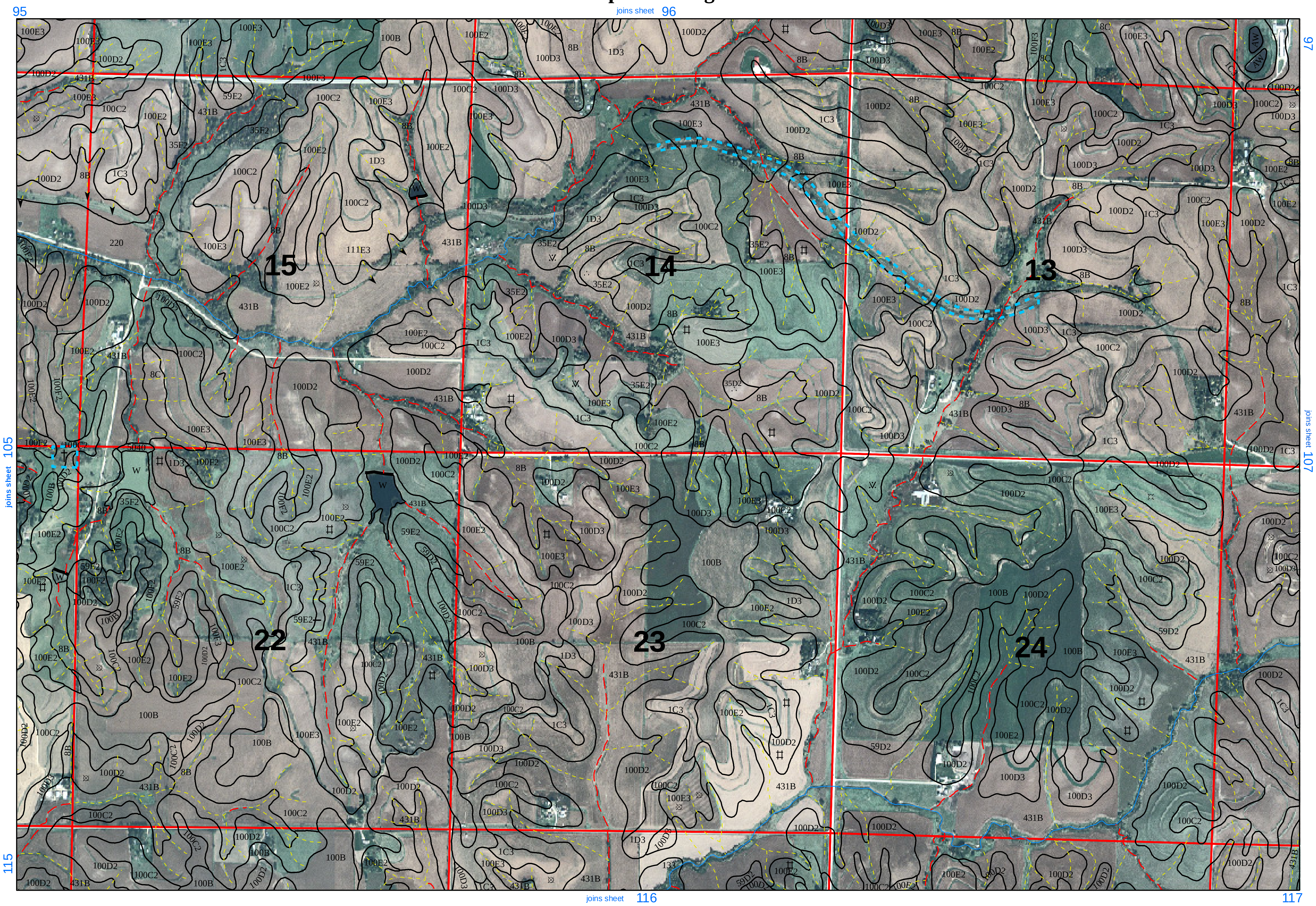

0 | 1/4 | 1/2 | 3/4 | 1 Miles

0 | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 Feet

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SSURGO certified soil tabular and spatial data.

United States Department of Agriculture
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107

Township 82N Range 38W

107

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

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United States Department of Agriculture
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Township 82N Range 38W

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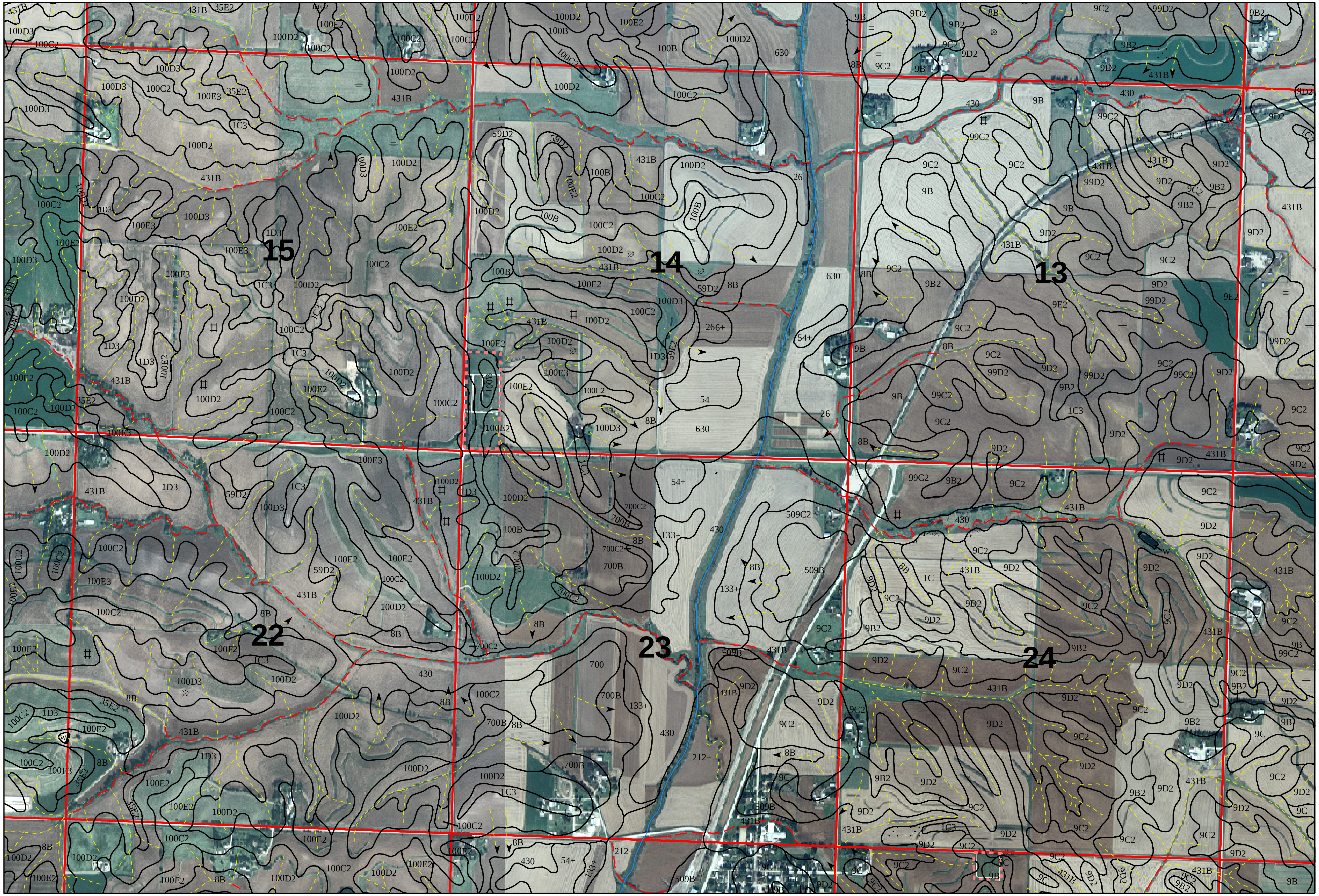

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 82N Range 37W

109

Soil Survey of Crawford County, Iowa

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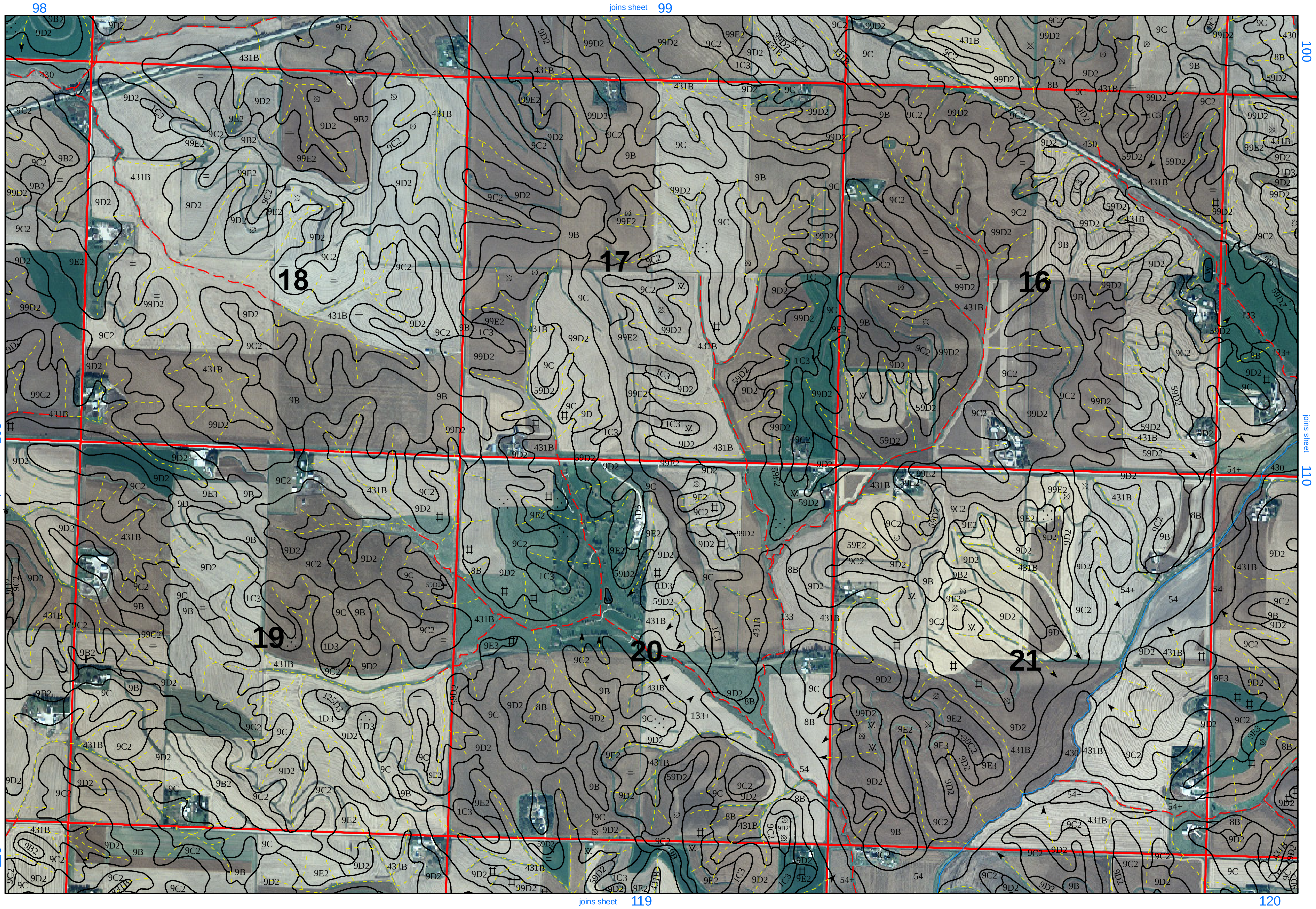

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 82N Range 37W

110

Soil Survey of Crawford County, Iowa

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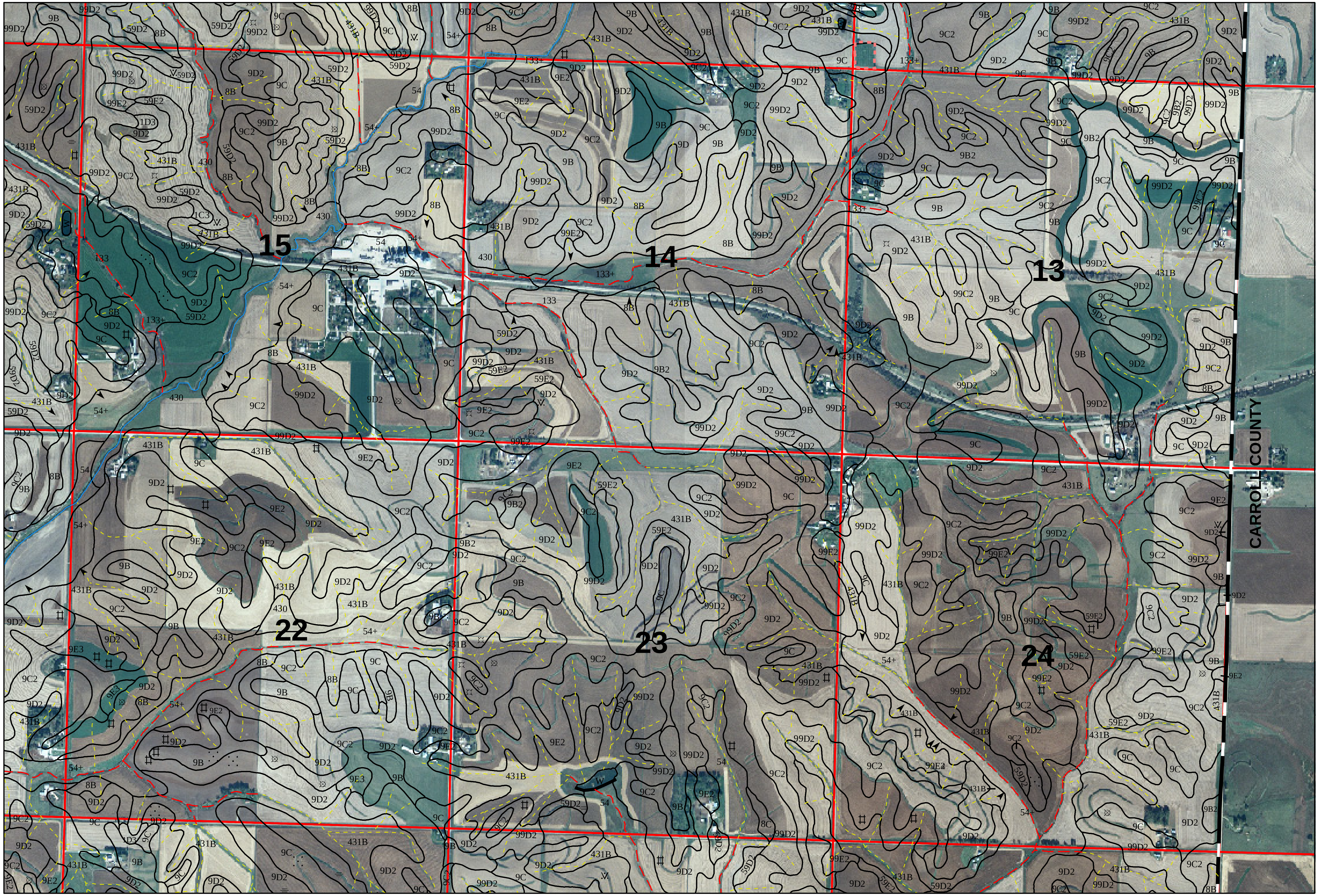
North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

99
joins sheet 100
joins sheet 109
119
joins sheet 120



0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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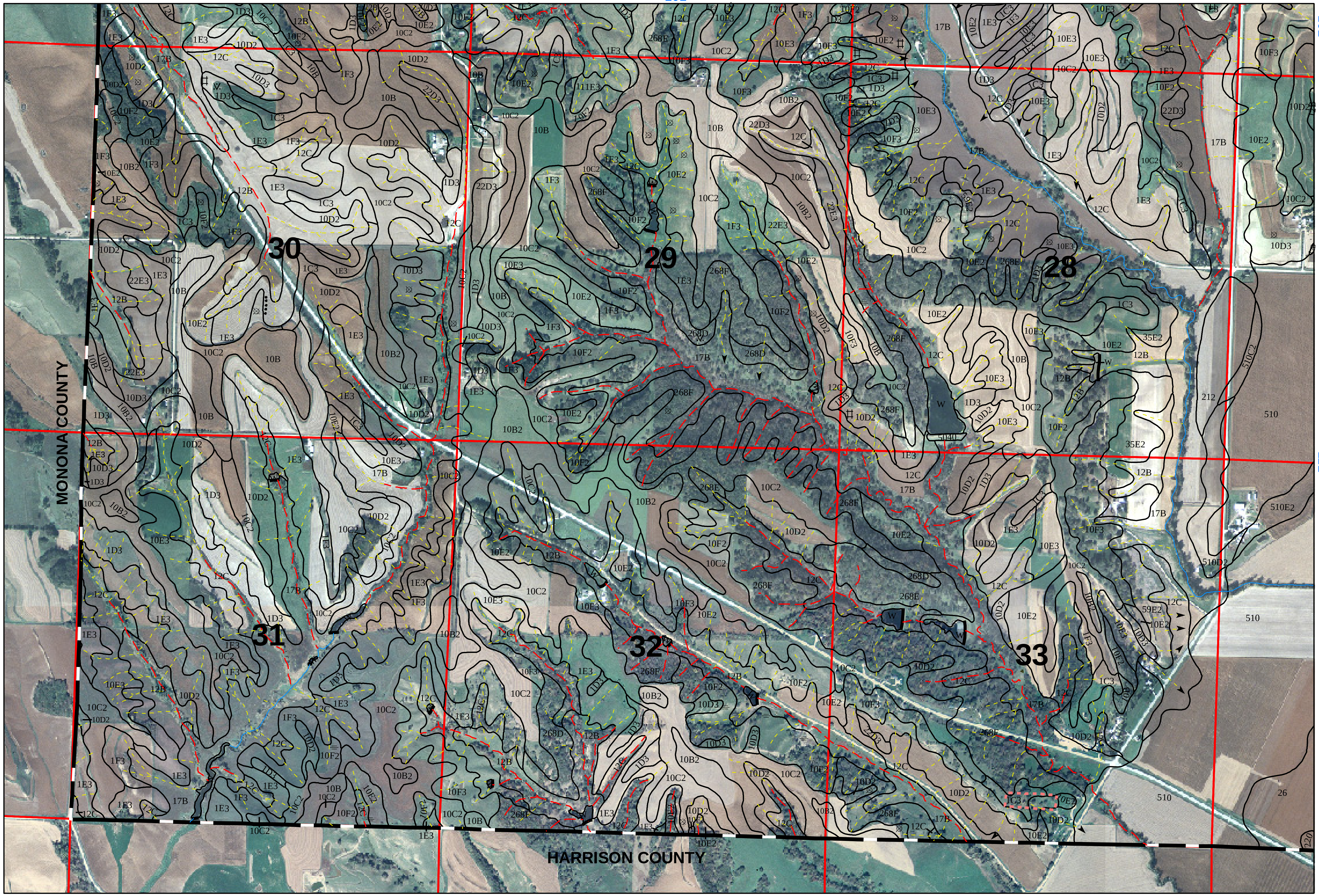
Township 82N Range 41W

joins sheet 101



111

Soil Survey of Crawford County, Iowa

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North American Datum of 1983 (NAD83). GRS-80 Spheroid. Universal Transverse Mercator, zone 15.

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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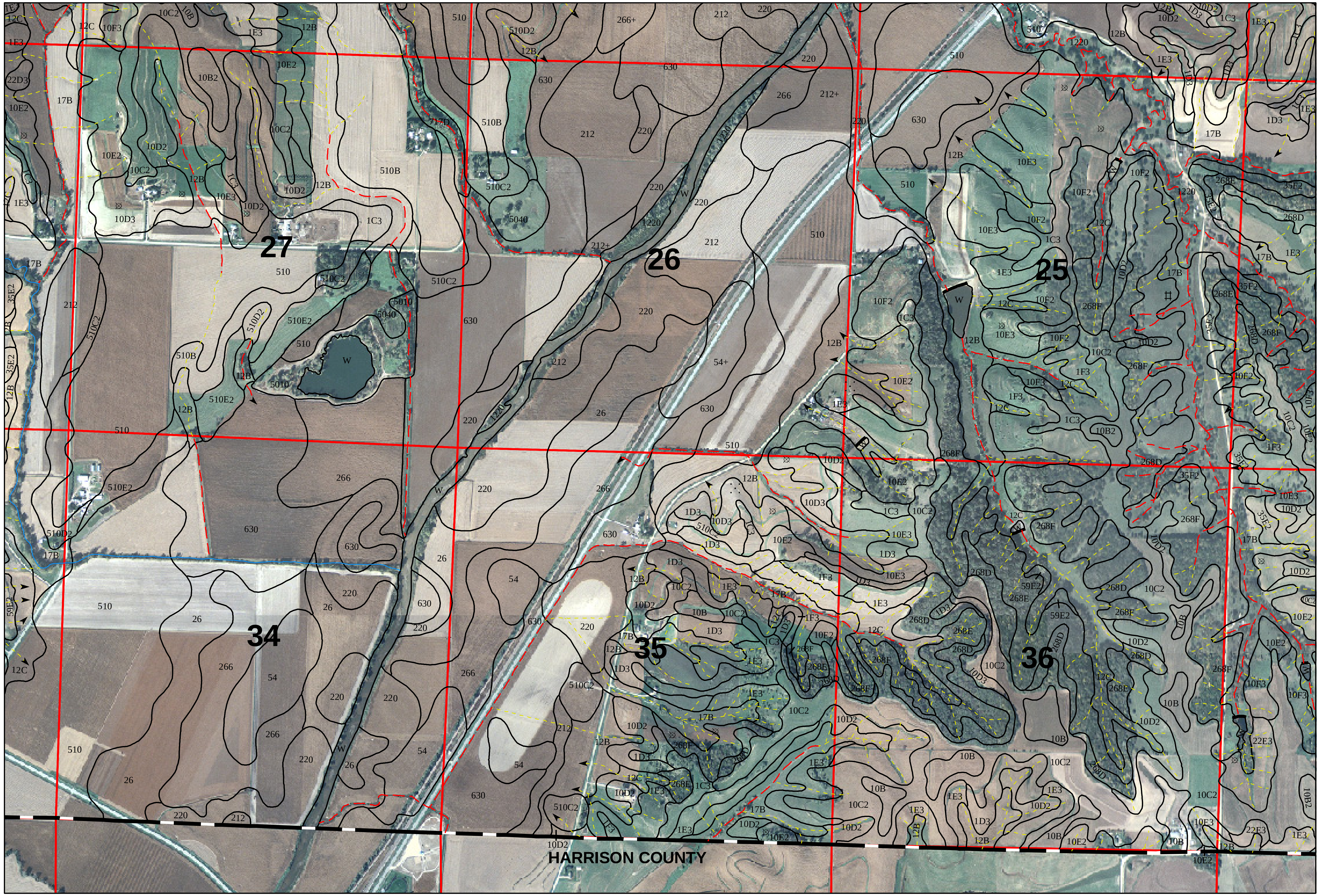
Township 82N Range 41W

101 joins sheet 102 103

joins sheet 111 joins sheet 113



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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United States Department of Agriculture
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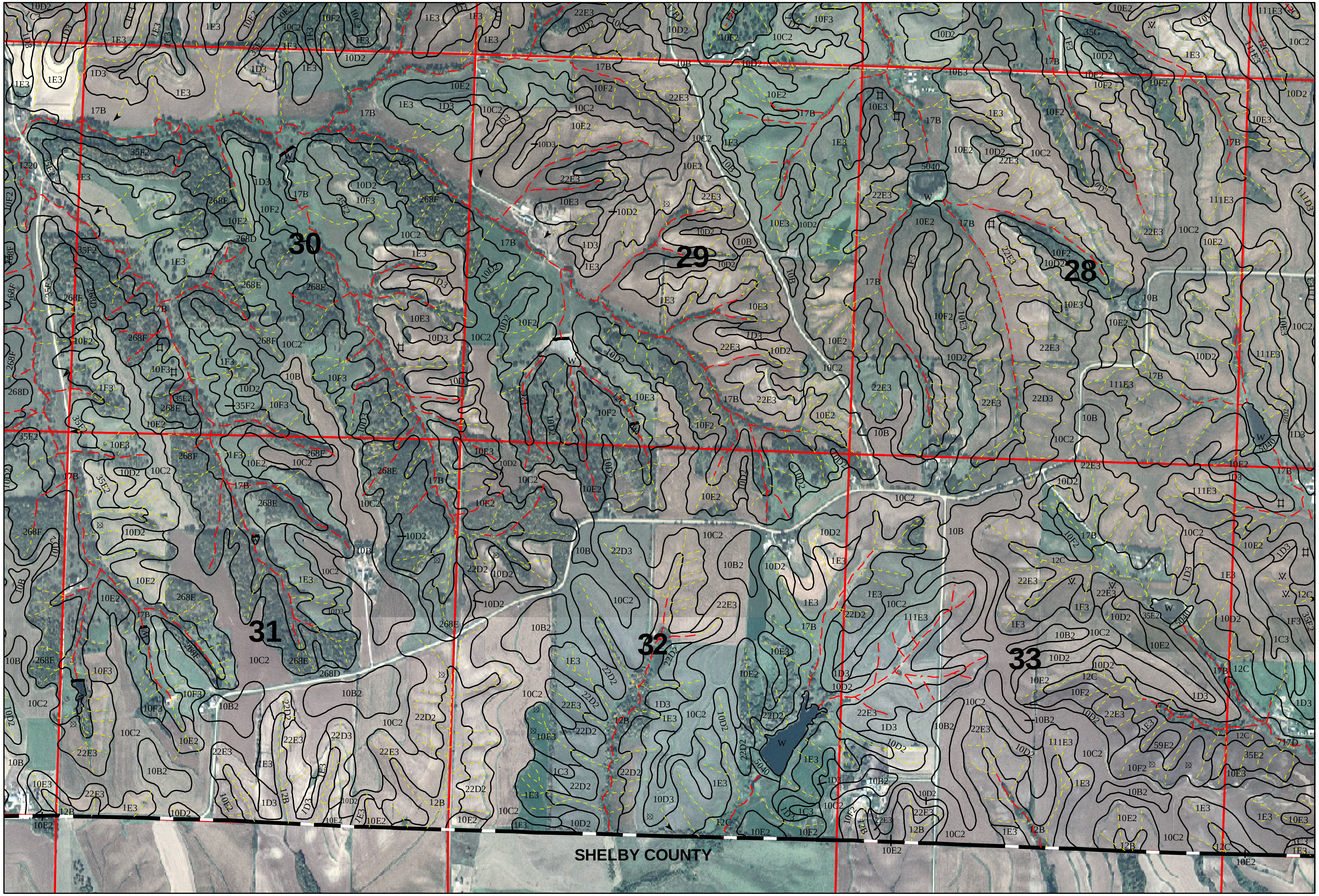
Township 82N Range 40W



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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Township 82N Range 40W

114

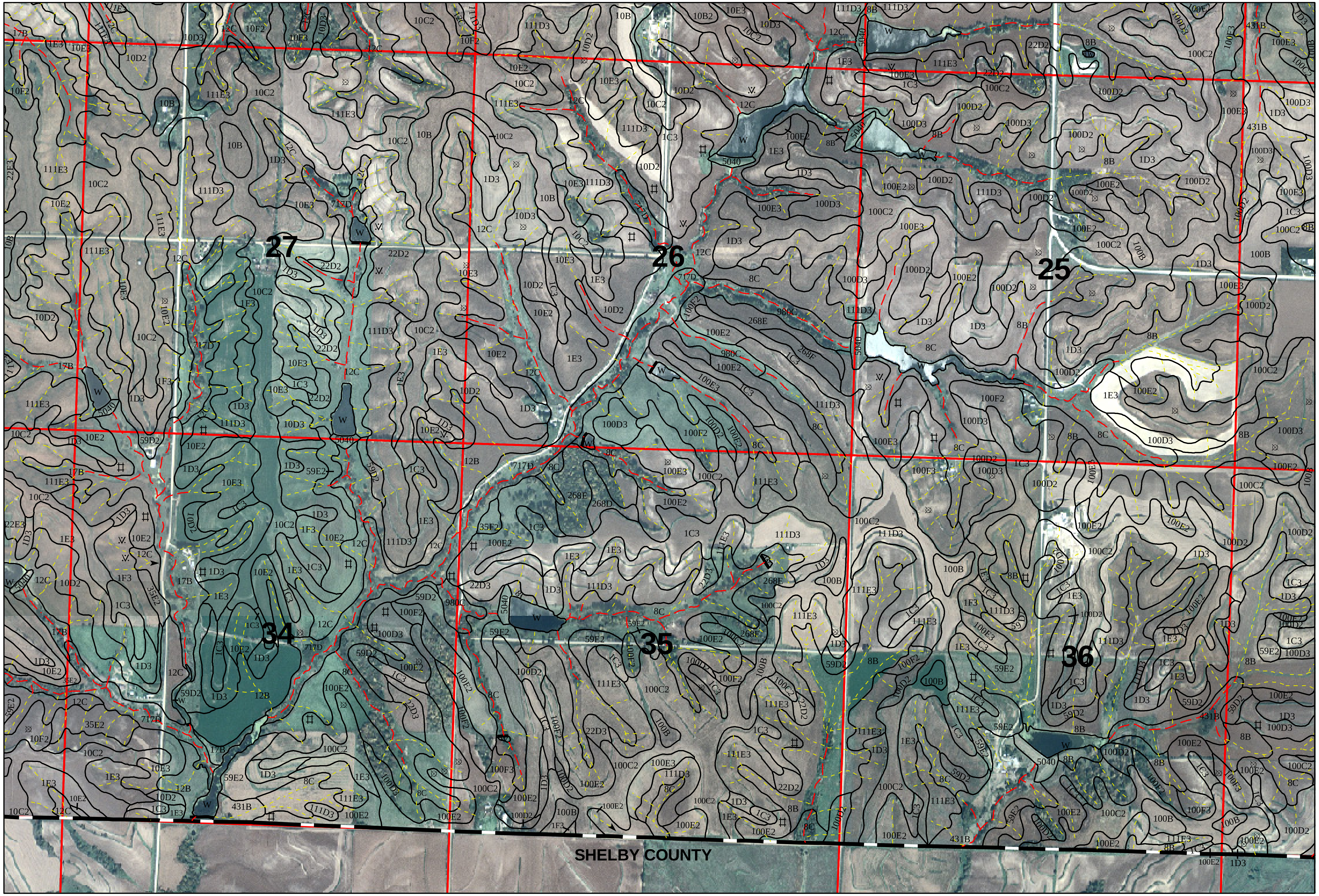
103

joins sheet 104

105

joins sheet 113

joins sheet 115



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0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 82N Range 39W

Soil Survey of Crawford County, Iowa

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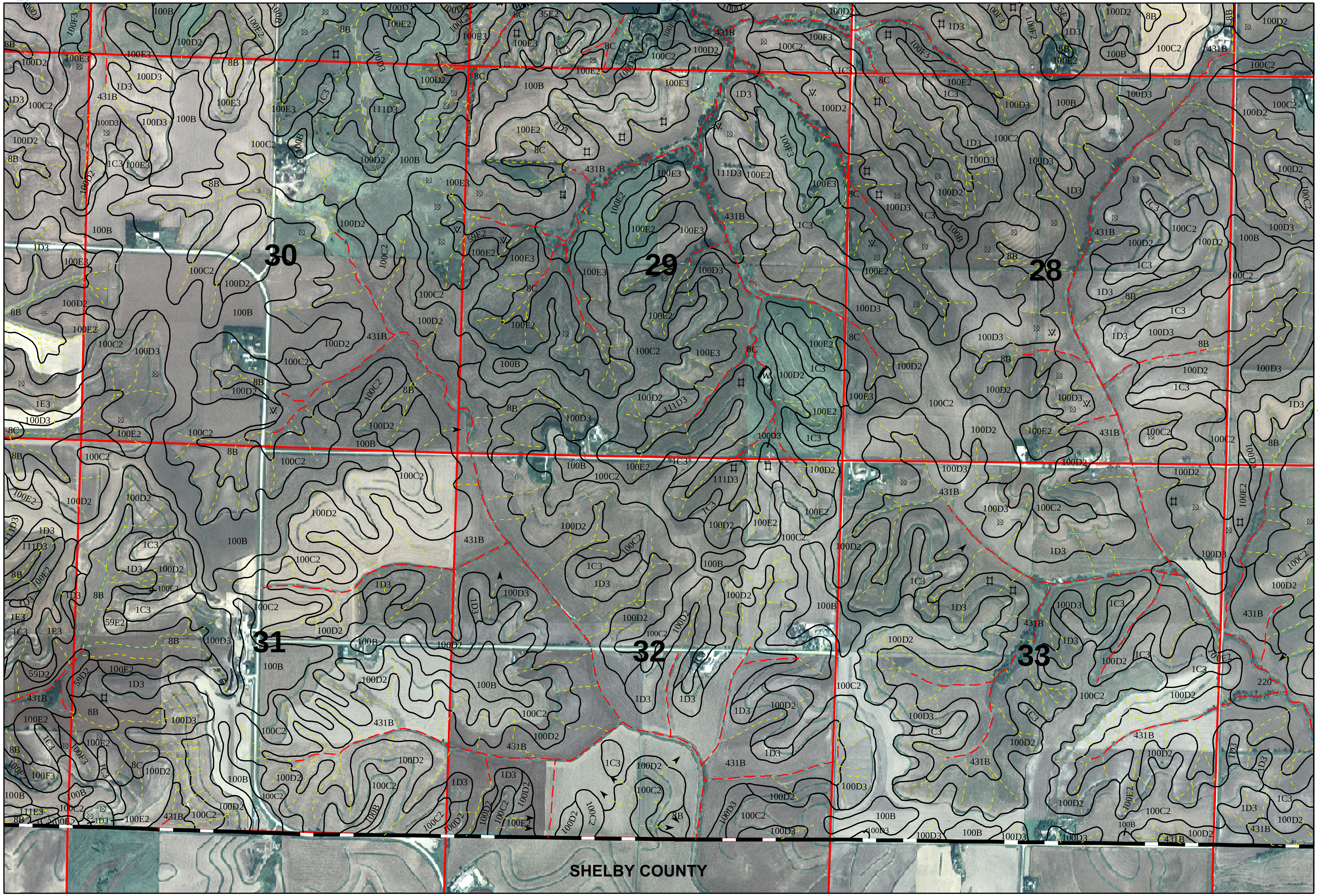
104

joins sheet 105

106

joins sheet 114

joins sheet 116



0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

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Township 82N Range 39W

116

Soil Survey of Crawford County, Iowa

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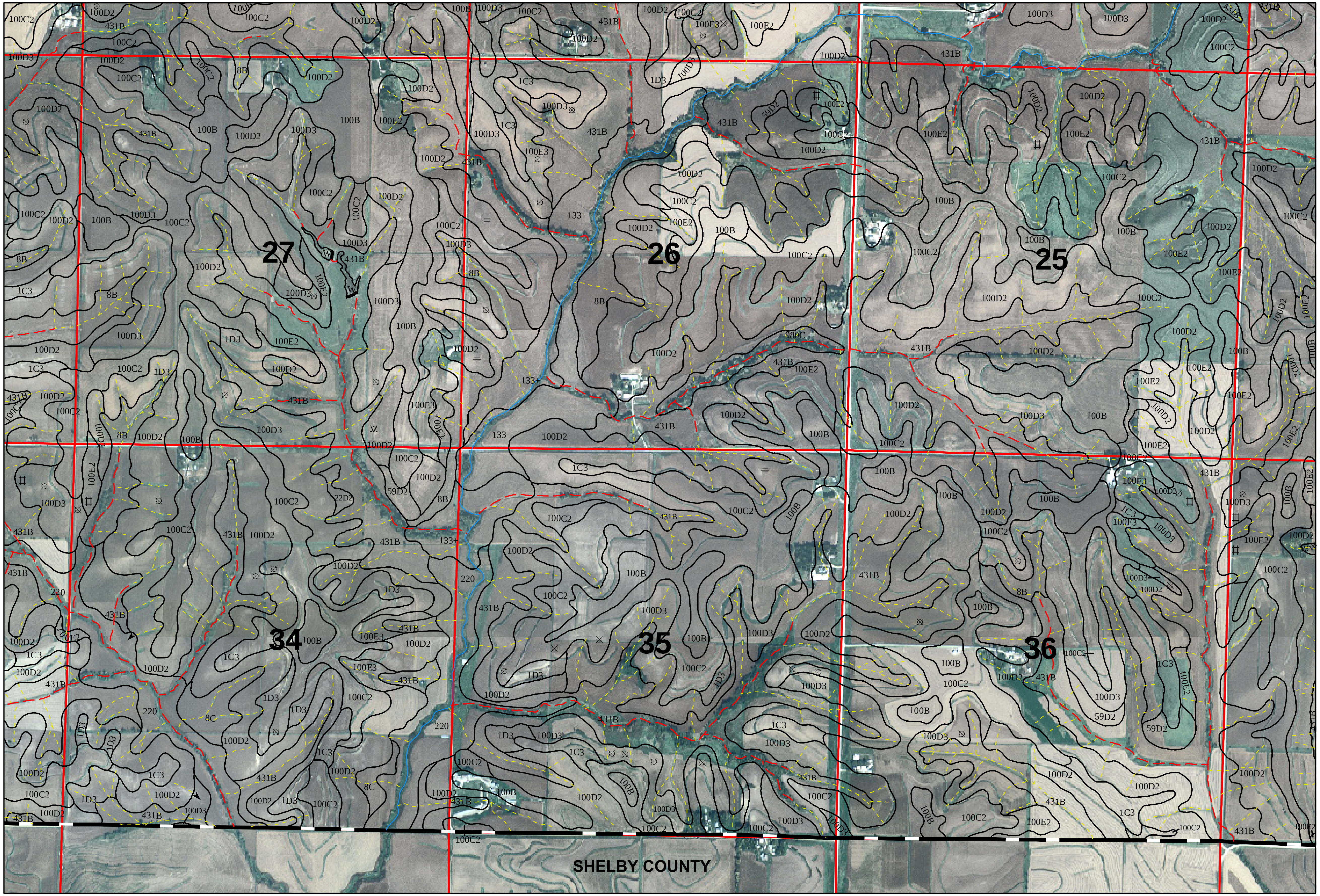

N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 82N Range 38W

106

joins sheet 107

108

joins sheet 116

joins sheet 118

Soil Survey of Crawford County, Iowa

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N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 82N Range 38W

Soil Survey of Crawford County, Iowa

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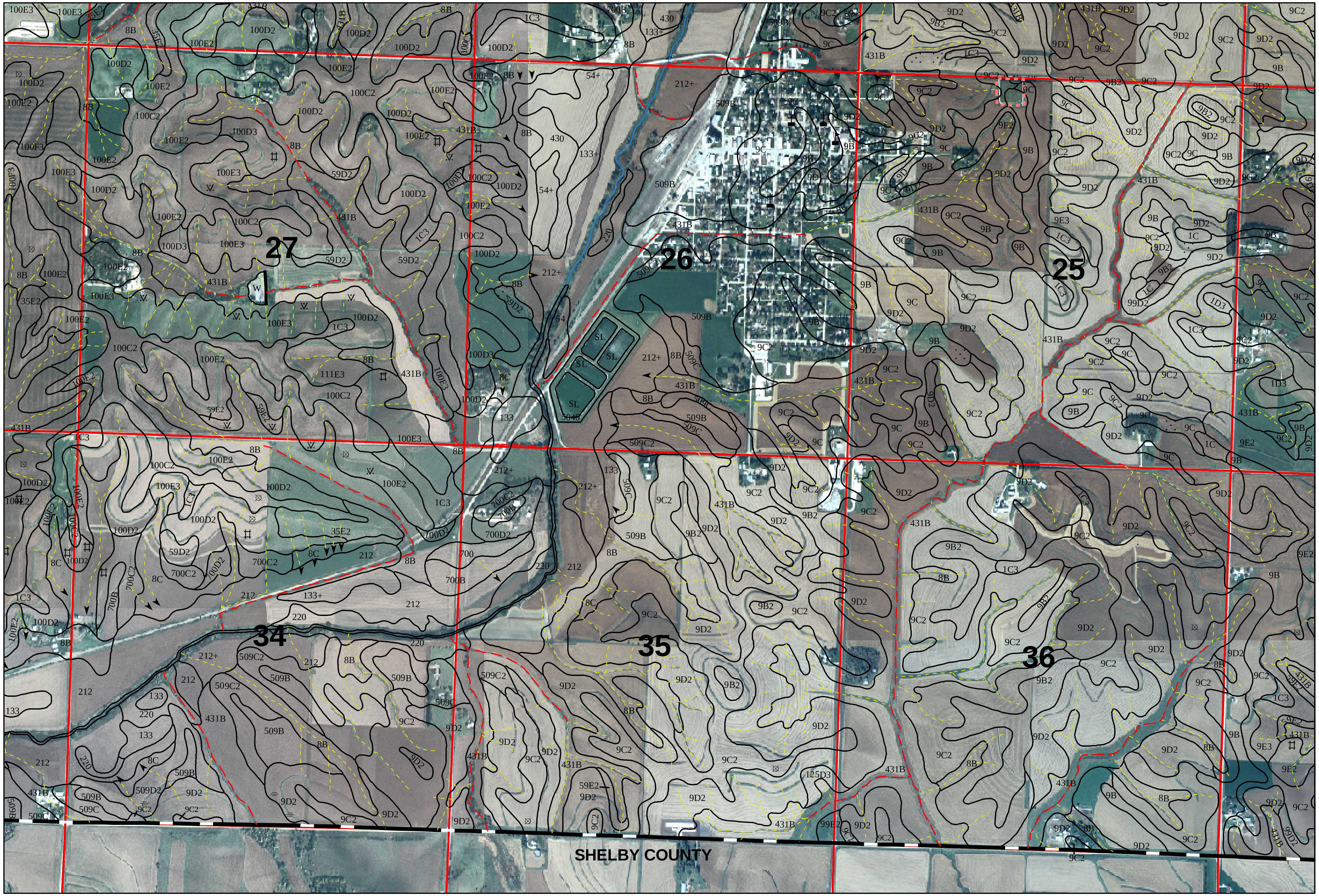

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431B

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

N

United States Department of Agriculture
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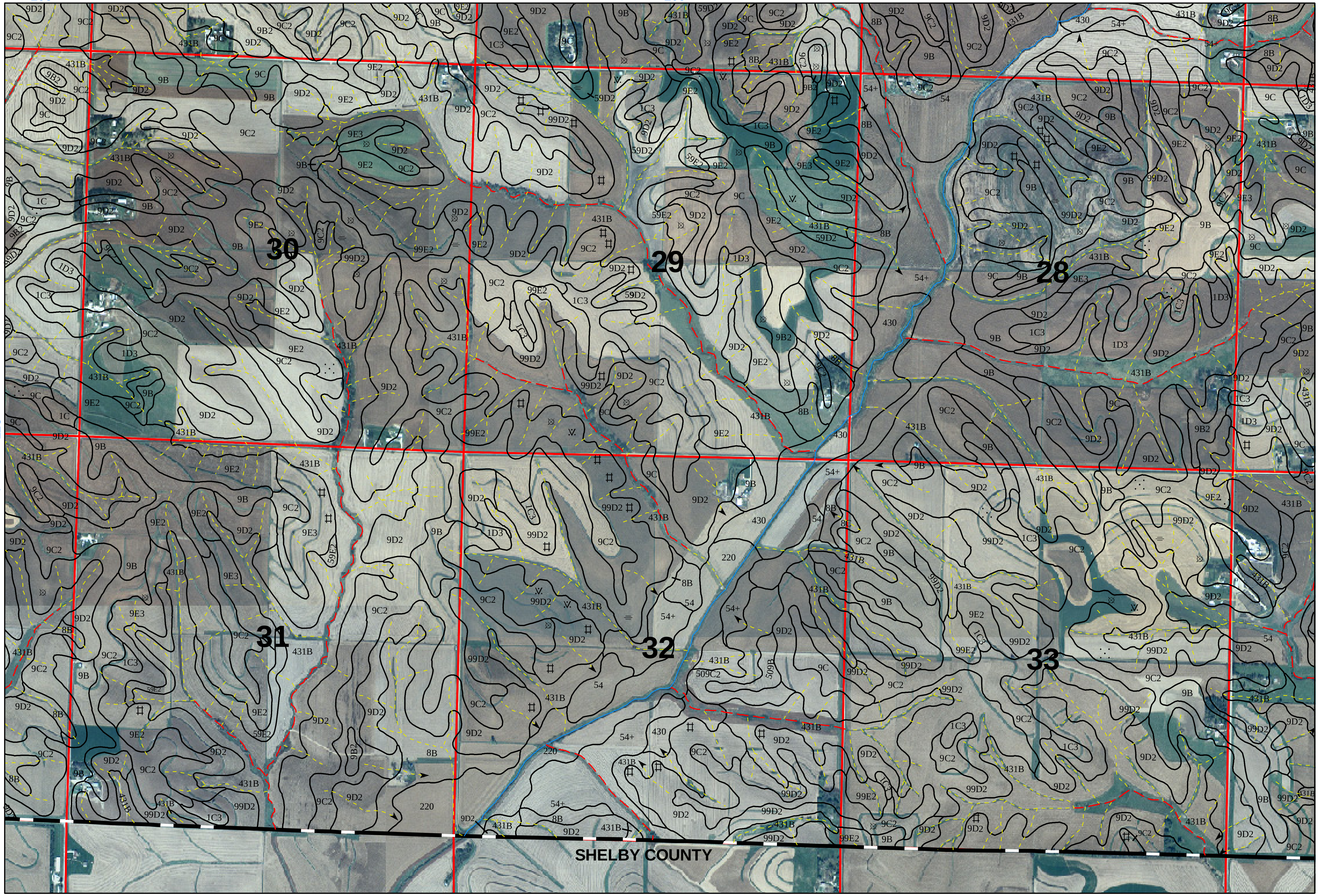
Township 82N Range 37W



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N

0 1/4 1/2 3/4 1 Miles

0 1,000 2,000 3,000 4,000 5,000 Feet

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Township 82N Range 37W

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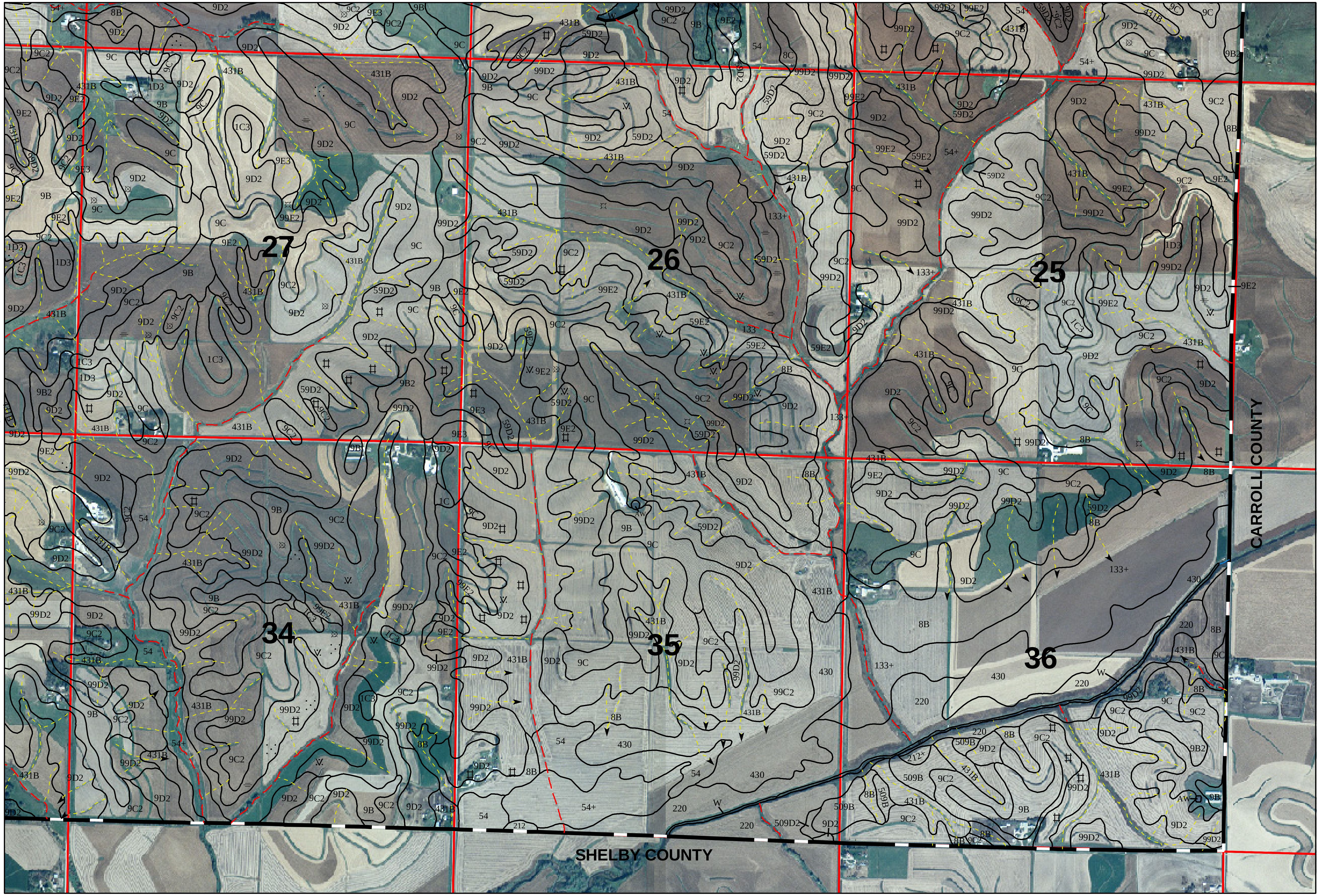
109

joins sheet 110

joins sheet 119



0 | 1/4 | 1/2 | 3/4 | 1 Miles

0 | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 Feet

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